

Hunters Point Naval Shipyard, Parcel G, RSY Data Report Page 1 of 139

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 32 Use 1	Soil Origin: TU153B ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 02/09/2021

Systematic Soil Sample Data: RSY 32 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-ESU-TU153B-001	1	Systematic	9,951	15,658	0.367	-0.0322	-0.0282	0.0236	0.00203
HPPG-ESU-TU153B-002	2	Systematic	9,718	15,658	0.460	0.0145	N/A	N/A	N/A
HPPG-ESU-TU153B-003	3	Systematic	10,374	15,658	0.491	-0.00101	N/A	N/A	N/A
HPPG-ESU-TU153B-004	4	Systematic	11,084	15,658	0.427	-0.00221	N/A	N/A	N/A
HPPG-ESU-TU153B-005	5	Systematic	9,118	15,658	0.118	-0.0253	N/A	N/A	N/A
HPPG-ESU-TU153B-006	6	Systematic	10,748	15,658	0.381	0.0199	N/A	N/A	N/A
HPPG-ESU-TU153B-007	7	Systematic	10,323	15,658	0.382	0.0274	N/A	N/A	N/A
HPPG-ESU-TU153B-008	8	Systematic	10,299	15,658	0.389	0.0267	N/A	N/A	N/A
HPPG-ESU-TU153B-009	9	Systematic	10,214	15,658	0.378	0.0422	N/A	N/A	N/A
HPPG-ESU-TU153B-010	10	Systematic	8,767	15,658	0.367	-0.0243	N/A	N/A	N/A
HPPG-ESU-TU153B-011	11	Systematic	10,666	15,658	0.380	-0.0371	-0.00903	0.00992	0.00197
HPPG-ESU-TU153B-012	12	Systematic	10,802	15,658	0.367	-0.0521	N/A	N/A	N/A
HPPG-ESU-TU153B-013	13	Systematic	10,387	15,658	0.489	0.00719	N/A	N/A	N/A
HPPG-ESU-TU153B-014	14	Systematic	10,177	15,658	0.329	0.0143	N/A	N/A	N/A
HPPG-ESU-TU153B-015	15	Systematic	9,374	15,658	0.207	-0.0243	N/A	N/A	N/A
HPPG-ESU-TU153B-016	16	Systematic	10,770	15,658	0.467	0.000177	N/A	N/A	N/A
HPPG-ESU-TU153B-017	17	Systematic	10,377	15,658	0.393	-0.000665	N/A	N/A	N/A
HPPG-ESU-TU153B-018	18	Systematic	9,952	15,658	0.326	-0.0163	N/A	N/A	N/A
HPPG-ESU-TU153B-019	19	Systematic	10,441	15,658	0.369	-0.0157	N/A	N/A	N/A
HPPG-ESU-TU153B-020	20	Systematic	9,262	15,658	0.278	0.0276	N/A	N/A	N/A
HPPG-ESU-TU153B-021	21	Systematic	9,749	15,658	0.337	0.00235	-0.00521	0.0171	-0.00396
HPPG-ESU-TU153B-022	22	Systematic	9,876	15,658	0.118	-0.0450	N/A	N/A	N/A
HPPG-ESU-TU153B-023	23	Systematic	10,641	15,658	0.458	-0.0103	N/A	N/A	N/A
HPPG-ESU-TU153B-024	24	Systematic	10,149	15,658	0.348	-0.0150	N/A	N/A	N/A
HPPG-ESU-TU153B-025	25	Systematic	9,950	15,658	0.494	0.00915	N/A	N/A	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Maximum					0.494	0.0422	-0.00521	0.0236	0.00203
Mean					0.3648	-0.0044	-0.0141	0.0169	0.0000133
Median					0.378	-0.001	-0.00903	0.0171	0.00197
Minimum					0.118	-0.0521	-0.0282	0.00992	-0.00396
Standard Deviation					0.1001	0.0244	N/A	N/A	N/A

Biased Soil Sample Data: RSY 32 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-ESU-TU153B-B-001	1	Biased	10,924	15,658	0.404	-0.0534	0.0677	0.0238	0.0206

CPM Counts per minute
pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10062020-PG-ROV-151	10/06/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10072020-PG-JSS-152	10/07/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10072020-PG-JSS-150	10/07/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10082020-PG-JSS-155	10/08/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 32 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 42 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 42 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-55. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 56-107). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 56-107). Samples HPPG-F-007 and HPPG-F-008 are field duplicates, correlating to systematic samples -004 and -014. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The alpha spectroscopy analyses for Uranium-235 and Plutonium-239 were requested after the samples and COC had been shipped to the lab (pages 138-139), which is why those analyses are not marked on the COCs. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 108-137). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 32 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-153B ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-153.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-32-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	3.01	31.07	14.42	14.03	3.97
ROI-06	55.13	137.34	95.03	95.20	11.65
ROI-07	40.09	113.22	73.38	73.16	9.63
ROI-08	79.17	170.36	118.64	119.22	13.23
ROI-10	1,952.53	2,771.88	2,422.10	2,452.51	137.91

Statistical Summary Reference Background

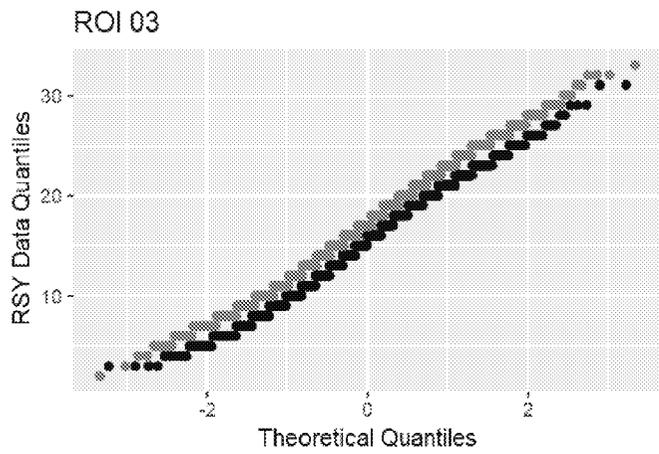
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

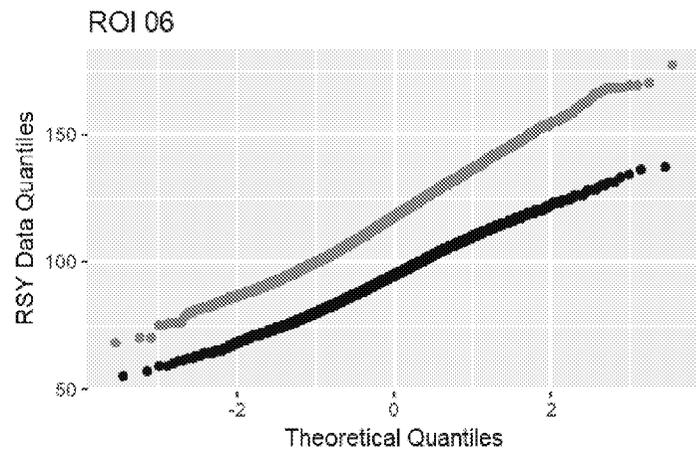
Dataset	Number of Data Points
PG-RSY-32-U1	4178
Scan RBA (Bldg 809)	4632

Soil Scan Statistics

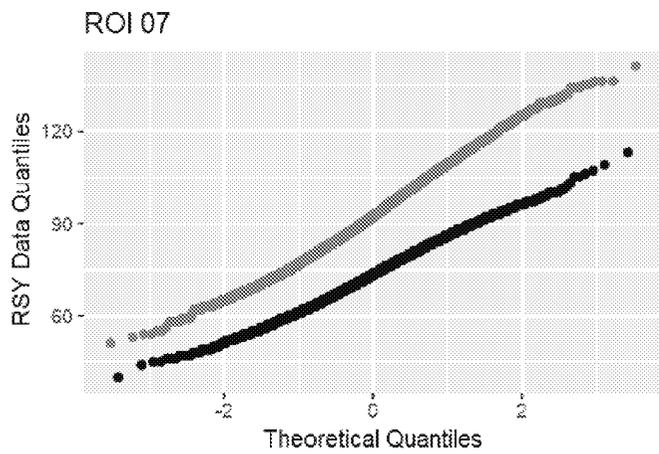
Normal Q-Q Plots



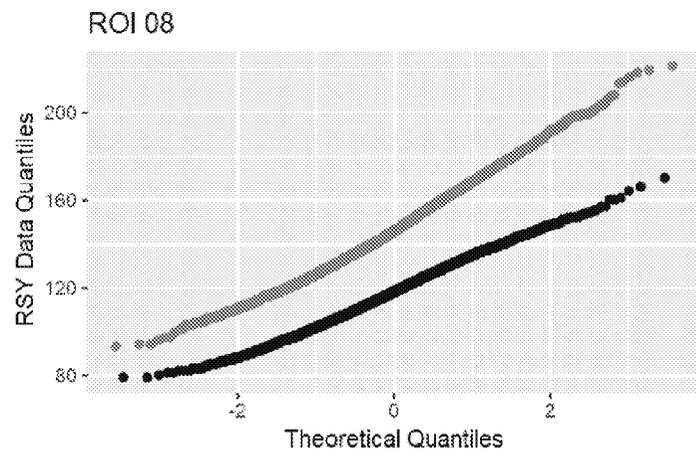
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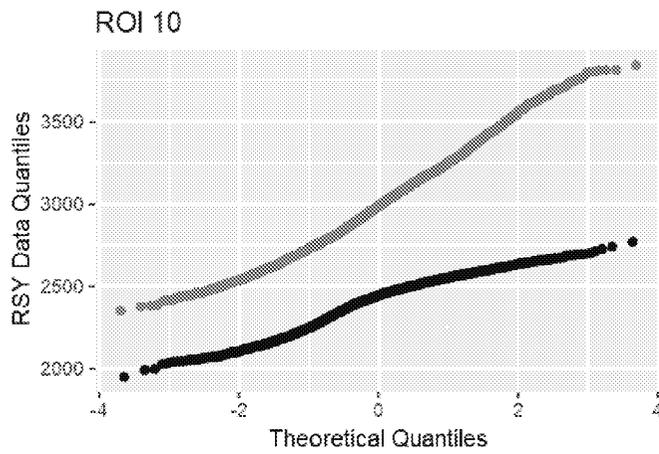
● PG-RSY-32-U1 * Scan RBA (Bldg 809)



● PG-RSY-32-U1 * Scan RBA (Bldg 809)



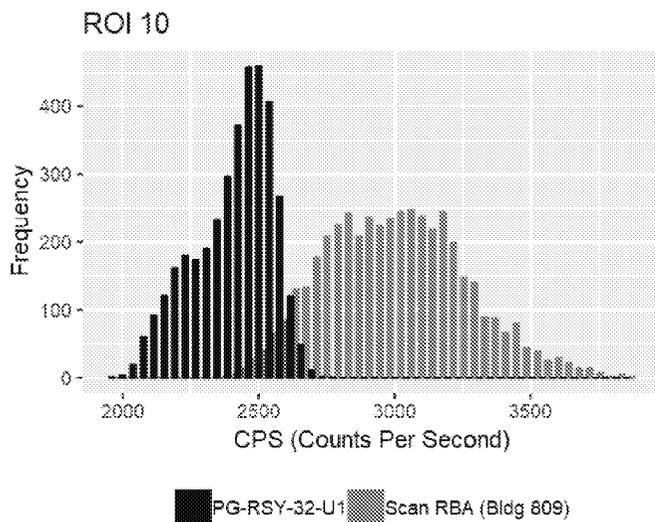
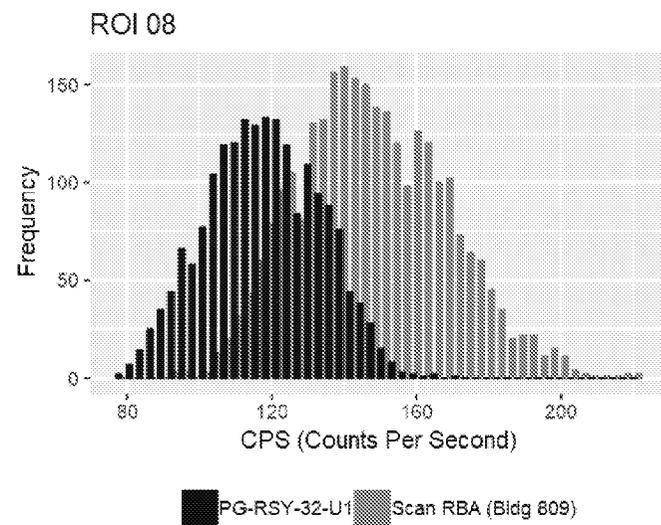
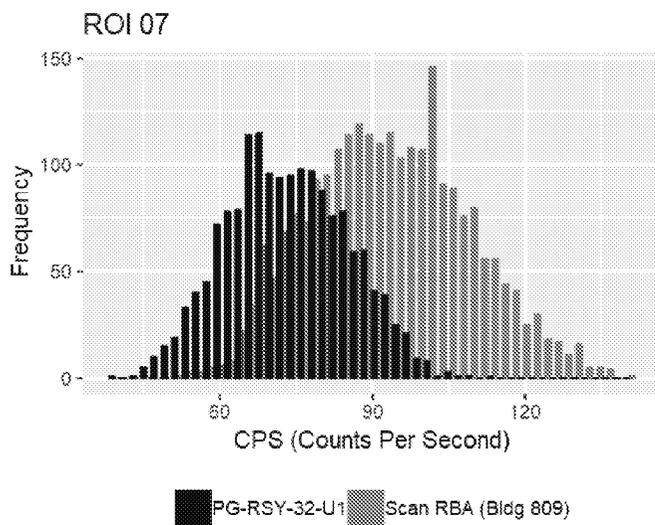
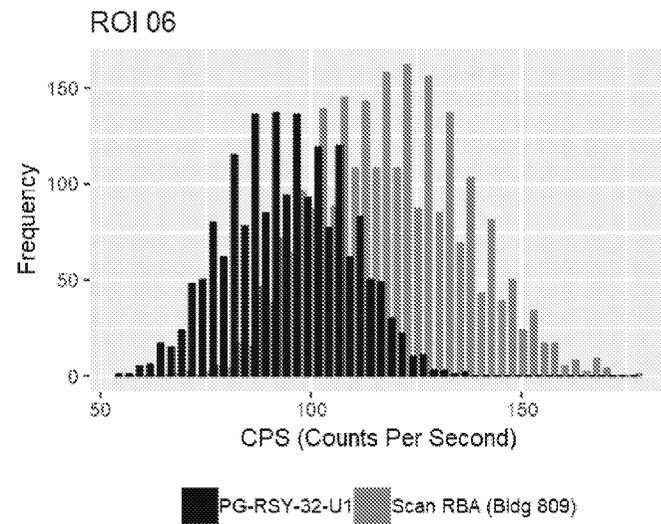
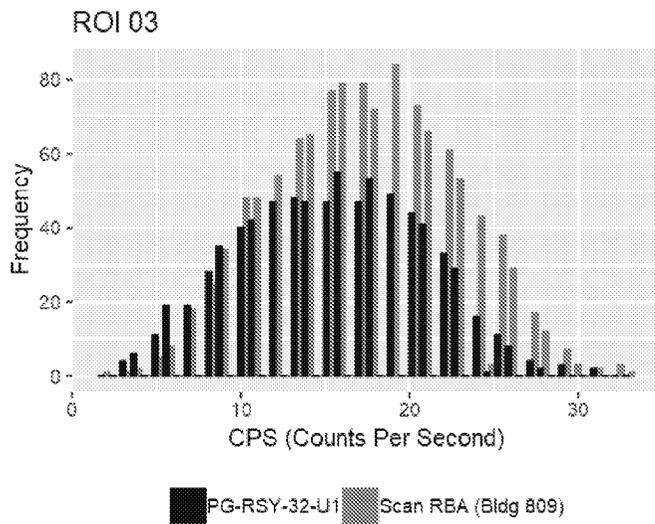
● PG-RSY-32-U1 * Scan RBA (Bldg 809)



● PG-RSY-32-U1 * Scan RBA (Bldg 809)

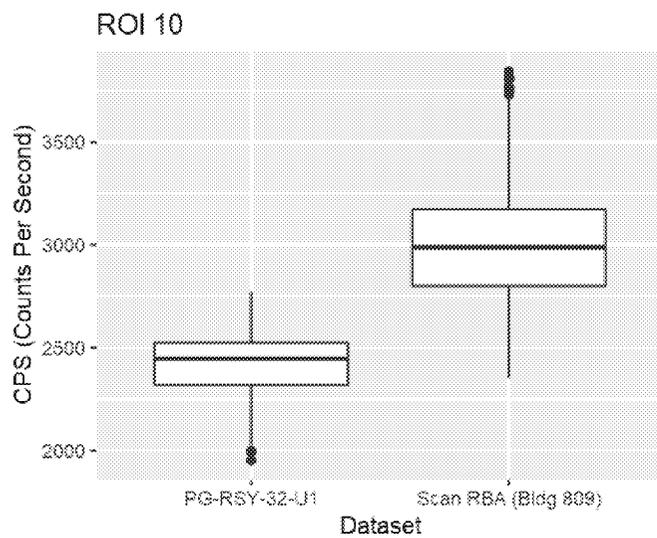
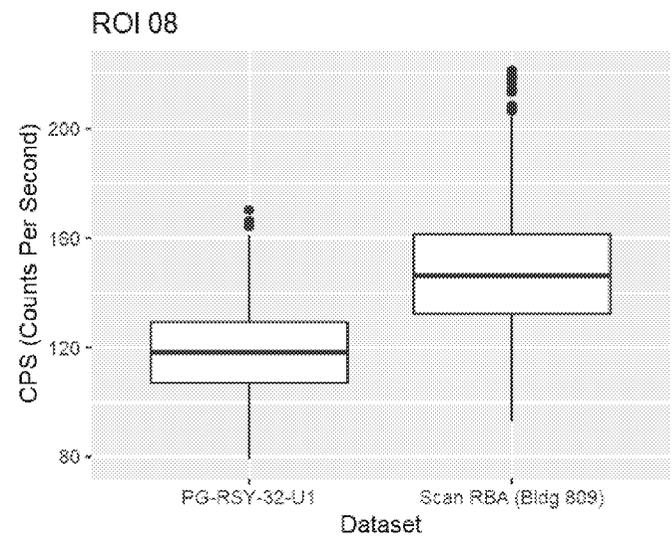
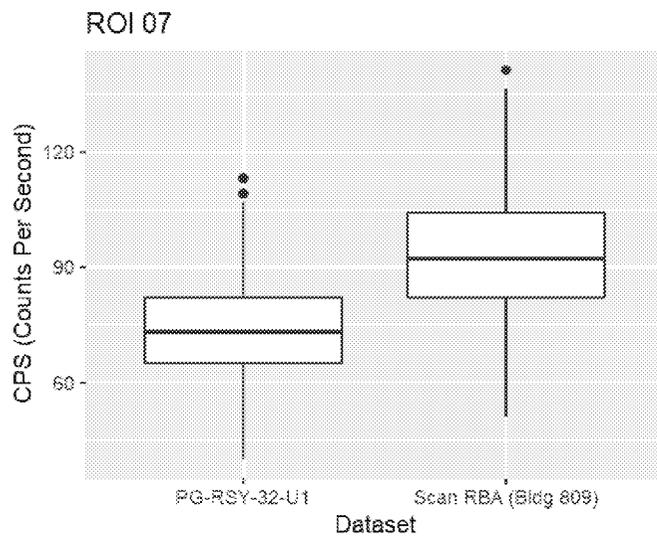
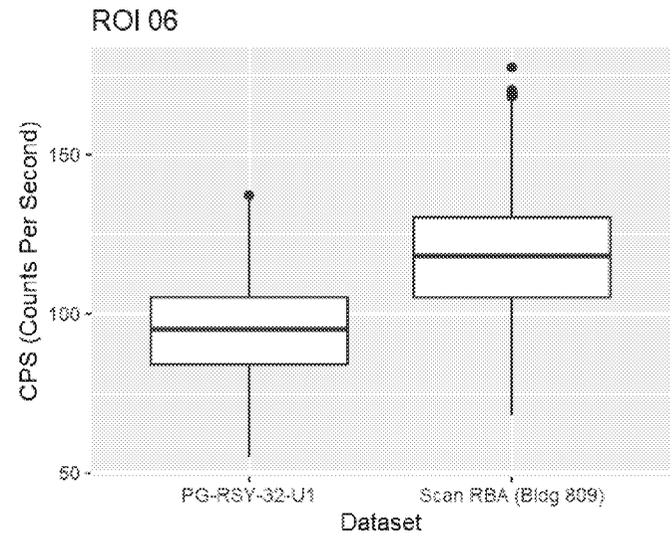
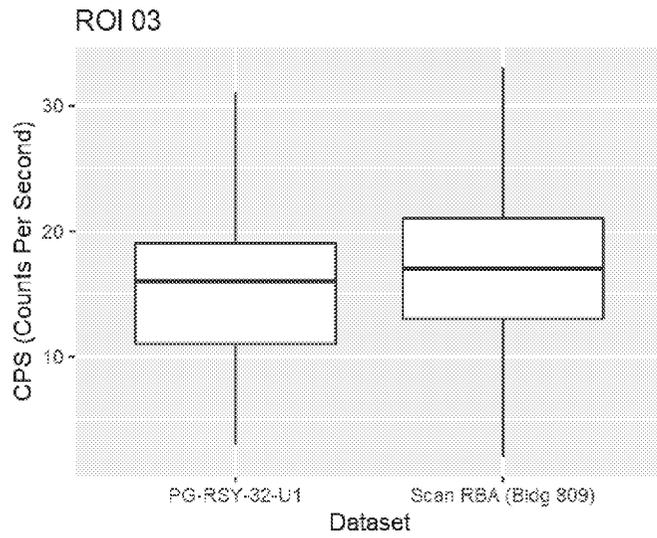
Soil Scan Statistics

Histograms



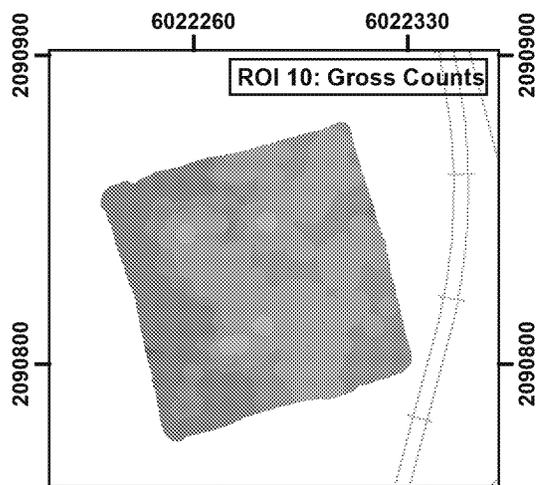
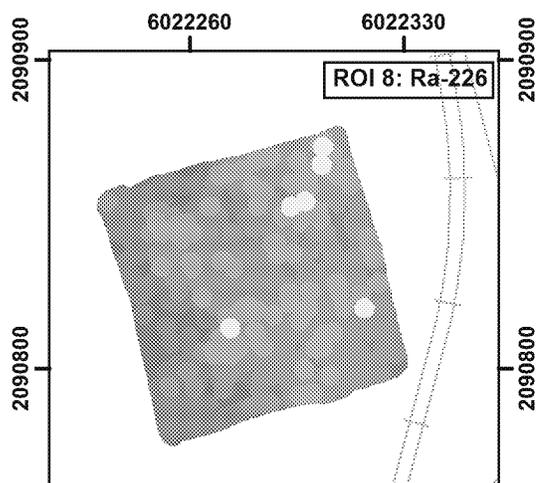
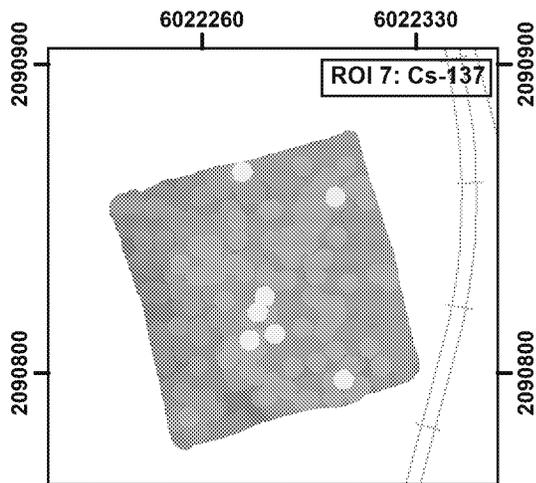
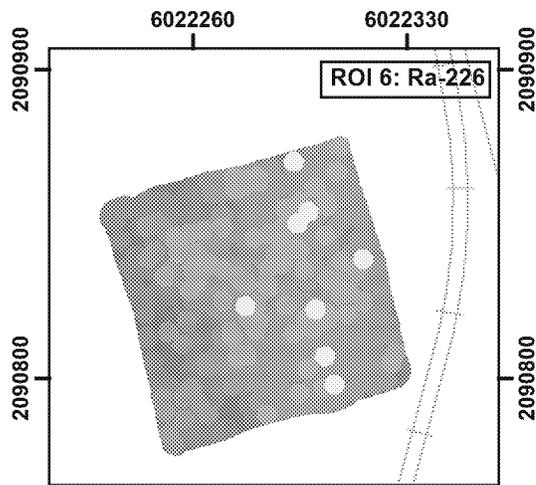
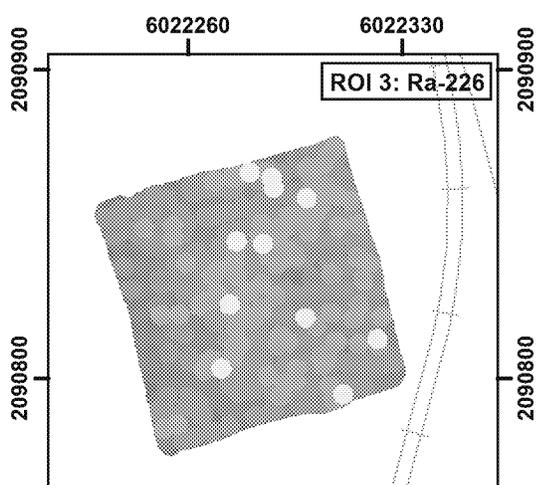
Soil Scan Statistics

Box Plots



RSI Data Plots
HPNS Parcel G
RSY 32 Use 1

TU-153B ESU



RS 700 Gamma Walkover Survey Data (VD1)

● > 3 std dev	● > -1 to < 0 std dev
● > 2 to < 3 std dev	● > -2 to < -1 std dev
● > 1 to < 2 std dev	● > -3 to < -2 std dev
● > 0 to < 1 std dev	● < -3 std dev



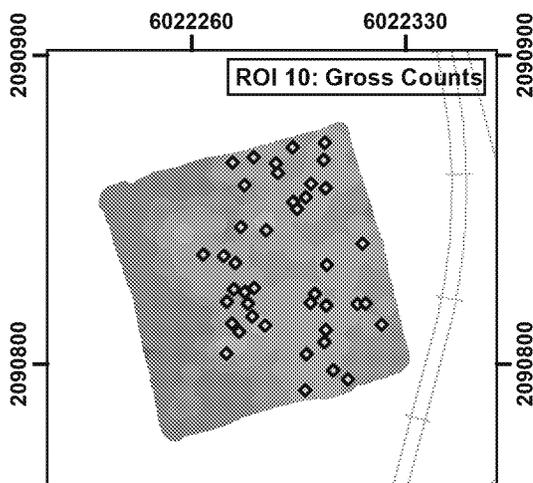
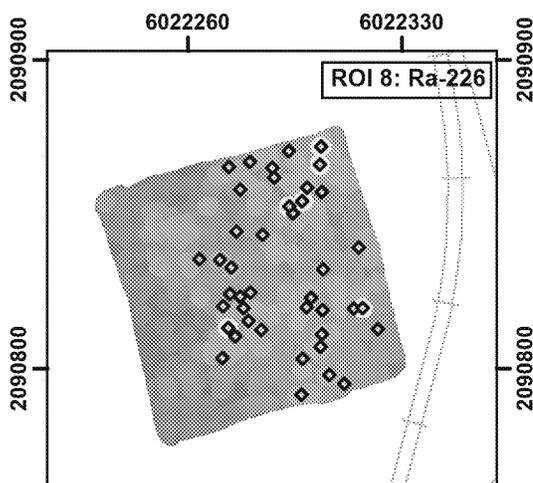
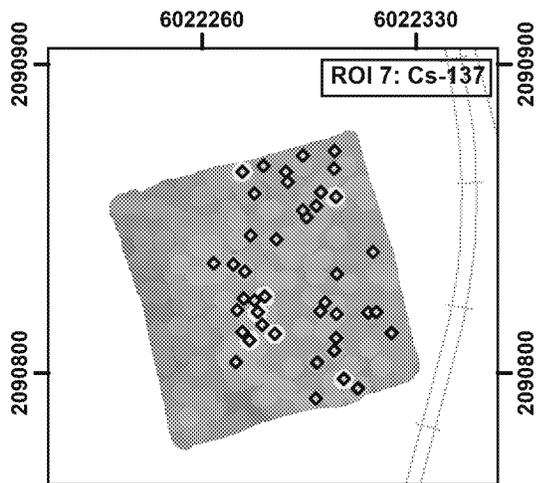
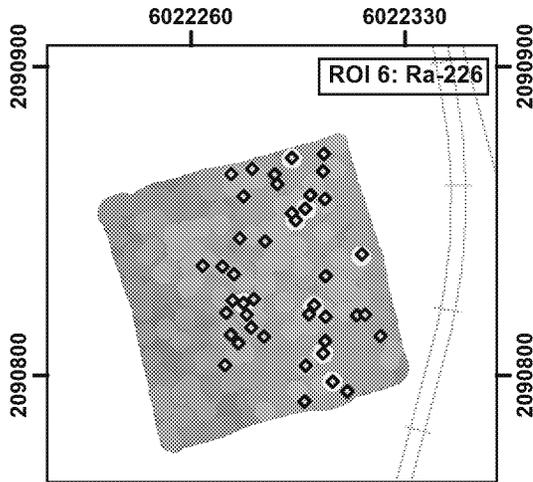
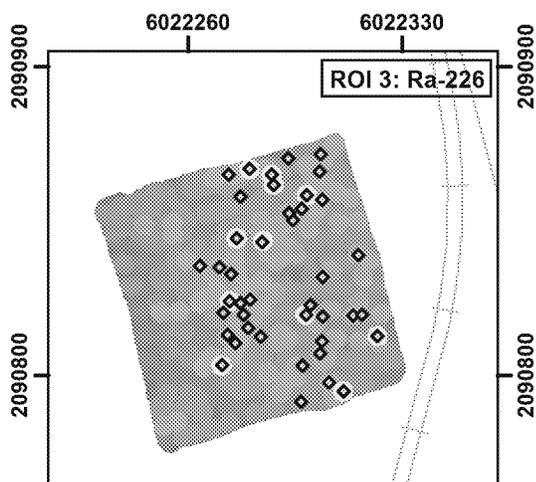
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RSI Data Plots
HPNS Parcel G
RSY 32 Use 1

TU-153B ESU



RS 700 Gamma Walkover Survey Data (VD1)

◆ Follow-Up Locations	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	



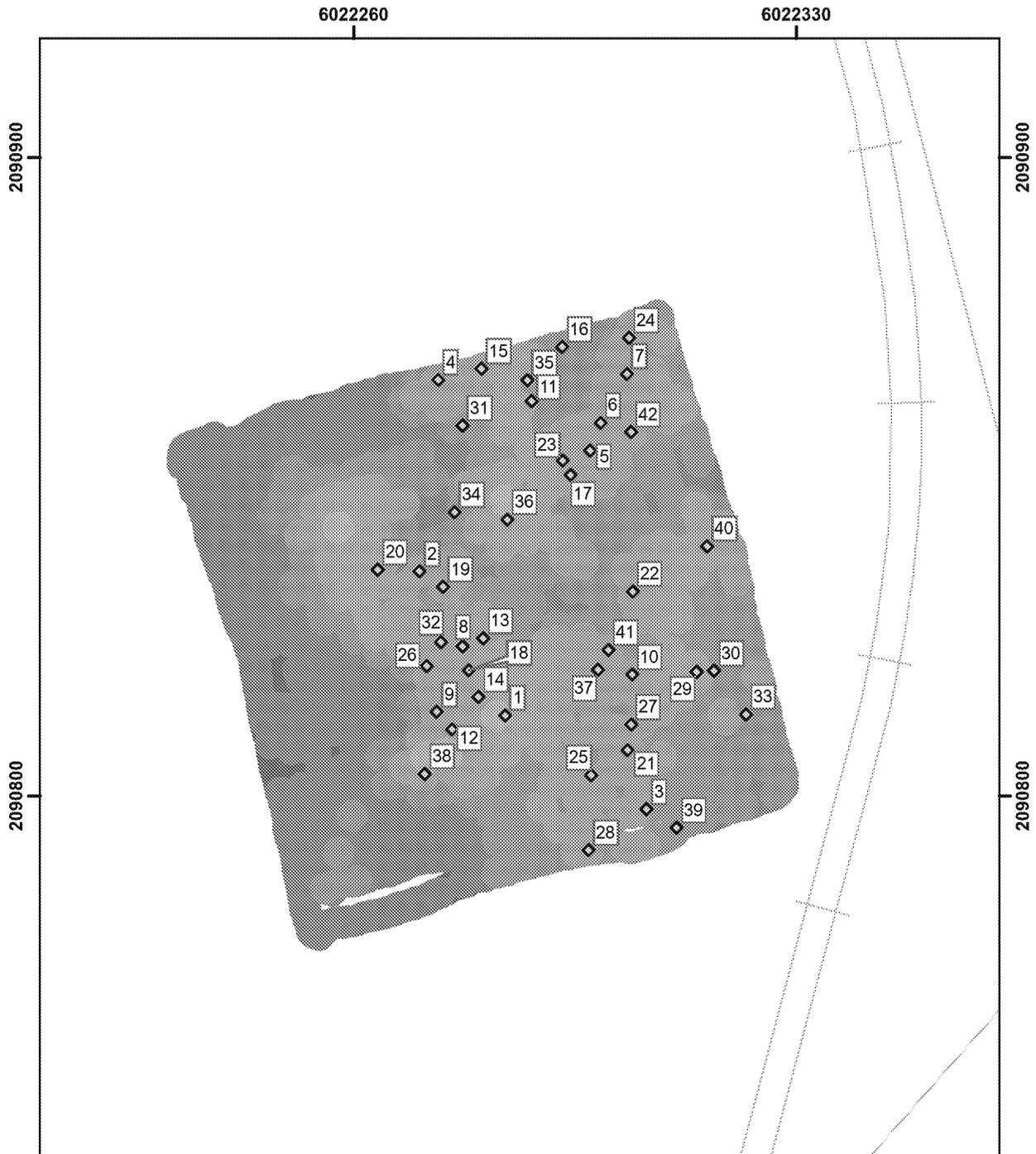
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Follow-Up Static Survey
 HPNS Parcel G
 RSY 32 Use 1

TU-153B ESU



RSY 32 Use 1 (VD1, ROI 10 Gross Gamma)

◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

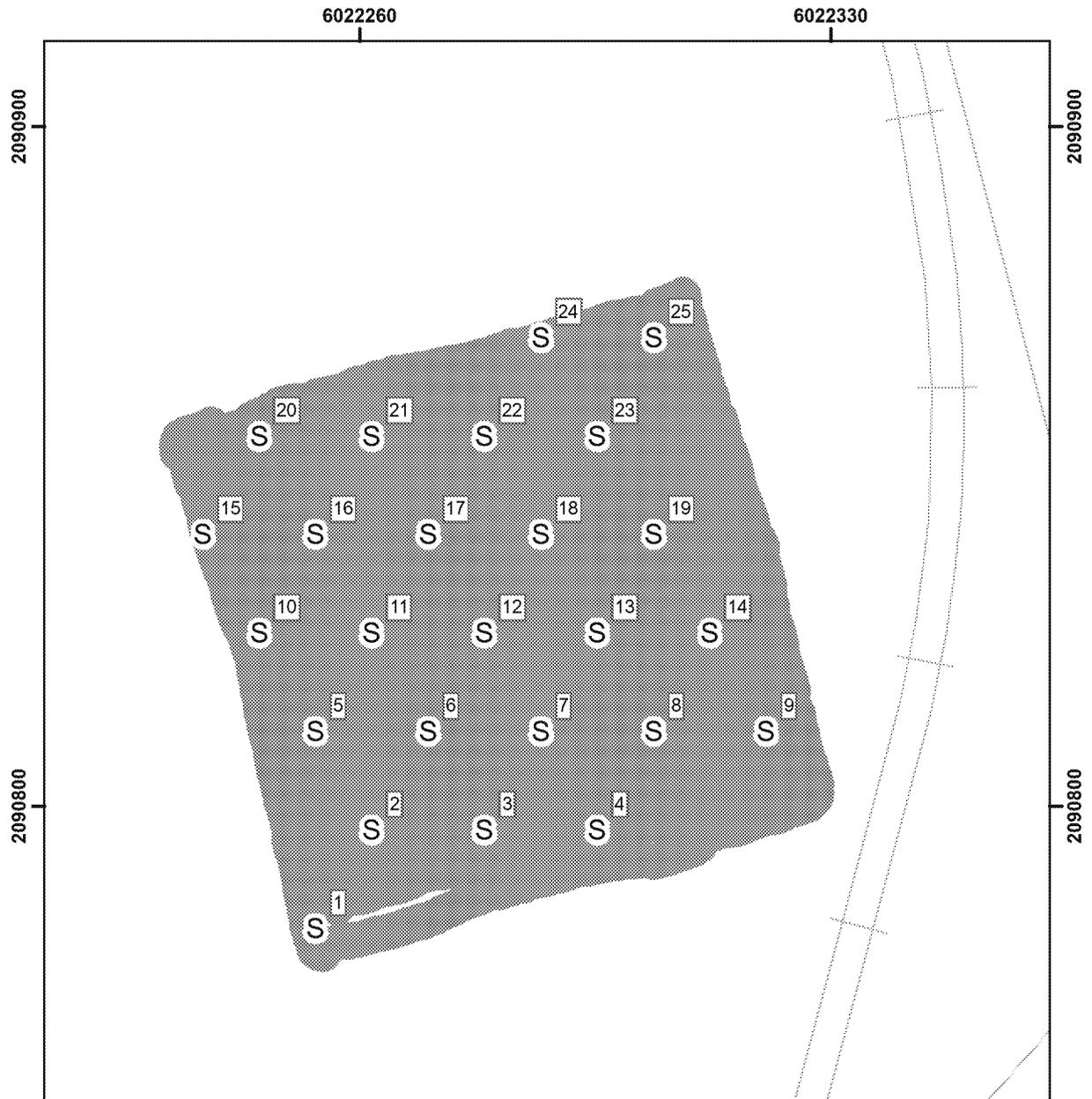
25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

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Systematic Sampling
HPNS Parcel G
RSY 32 Use 1

TU-153B ESU

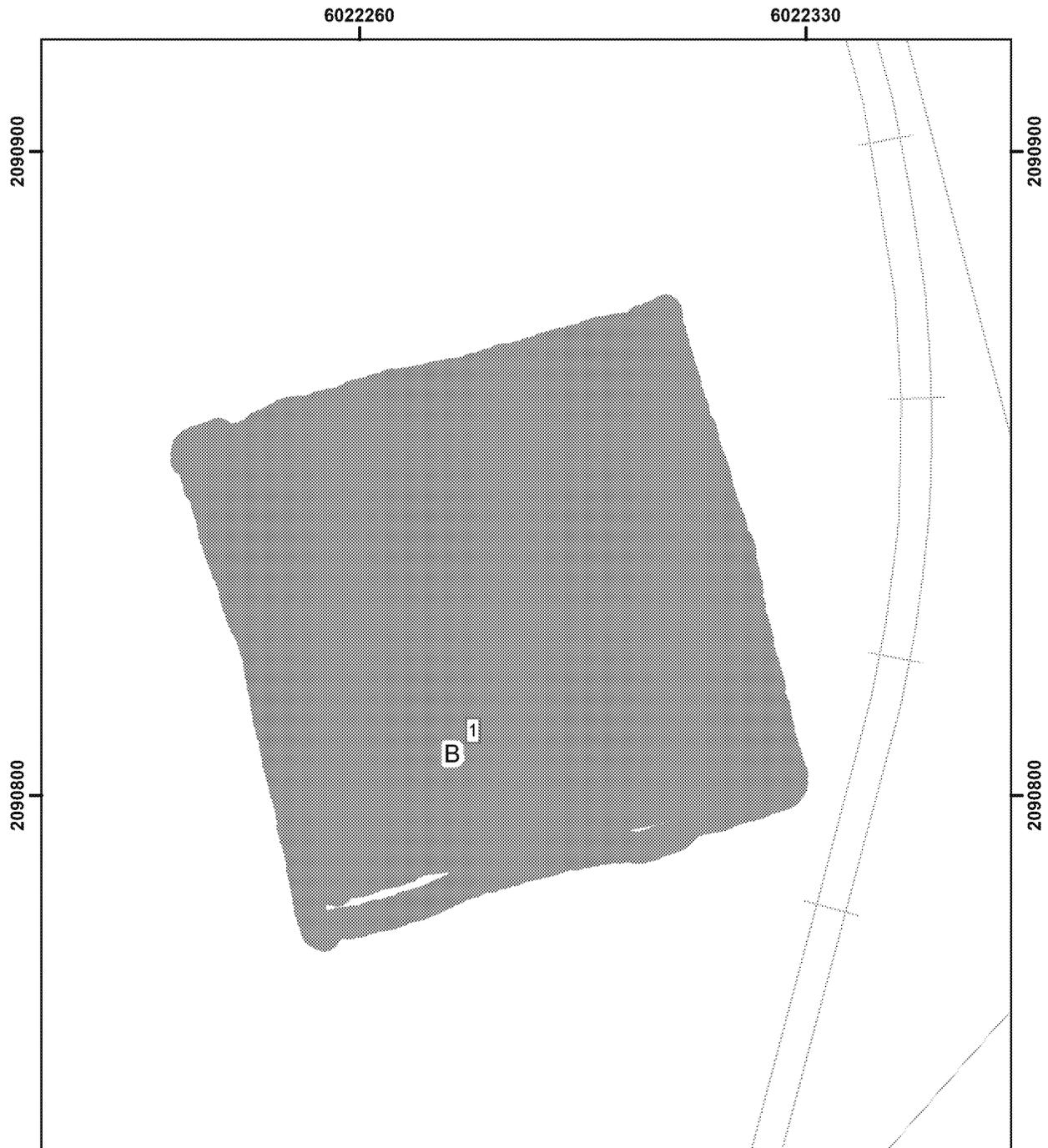


<p>RSY 32 Use 1</p> <p>S Systematic Sample Locations</p> <p>● RS-700 GWS Coverage</p>	<p>0 10 20 40 Feet</p> <p>Coordinate system: CSP Zone III, NAD83, US Survey Foot</p> 
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Biased Sampling
HPNS Parcel G
RSY 32 Use 1

TU-153B ESU



RSY 32 Use 1

- B Biased Sample Location
- RS-700 GWS Coverage

25 12.5 0 25 Feet

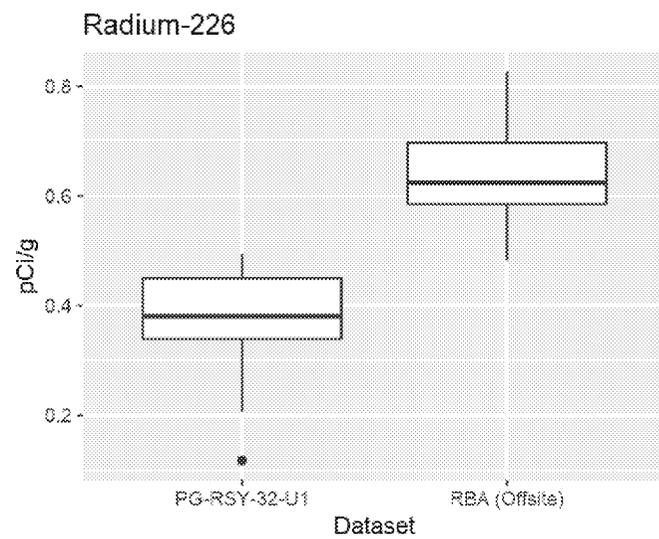
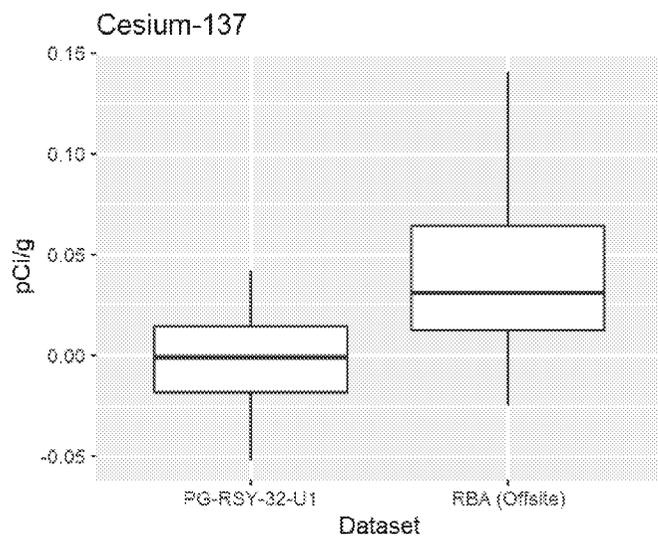
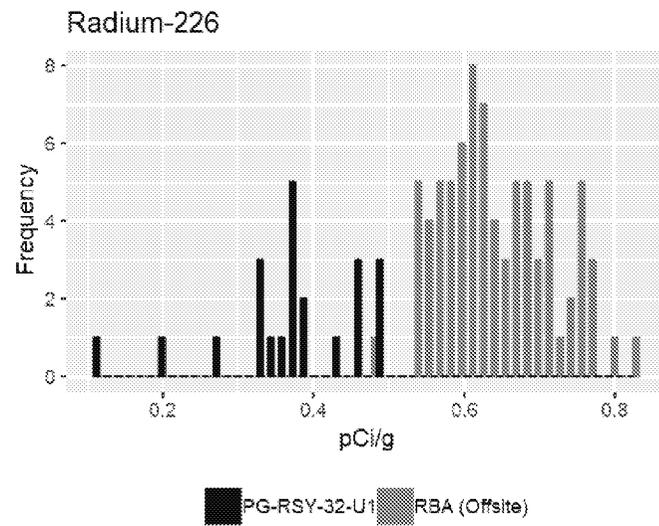
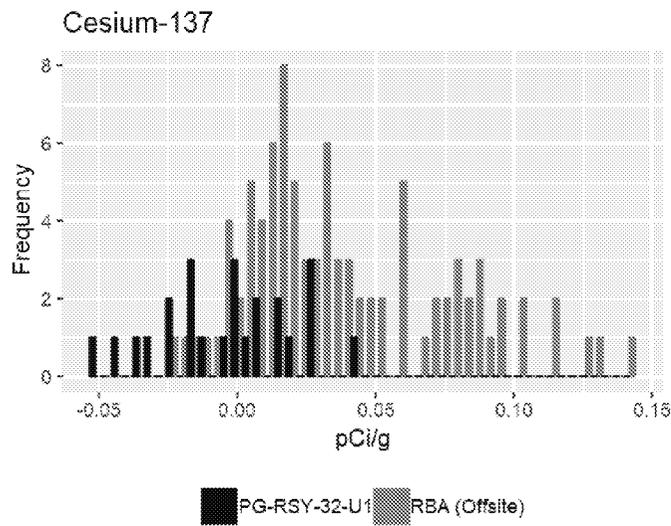
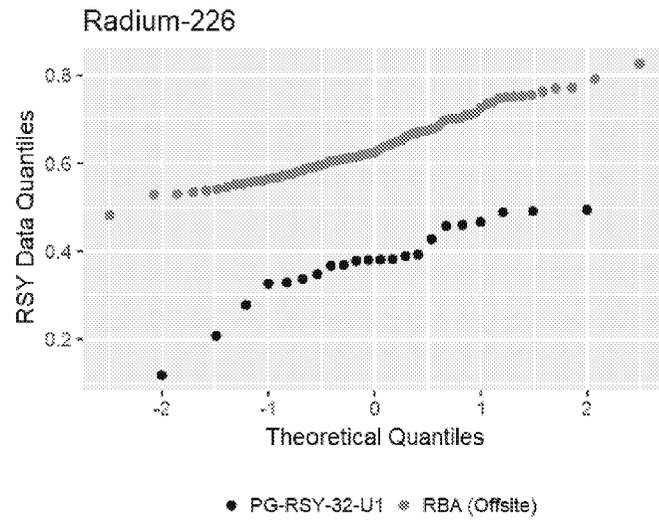
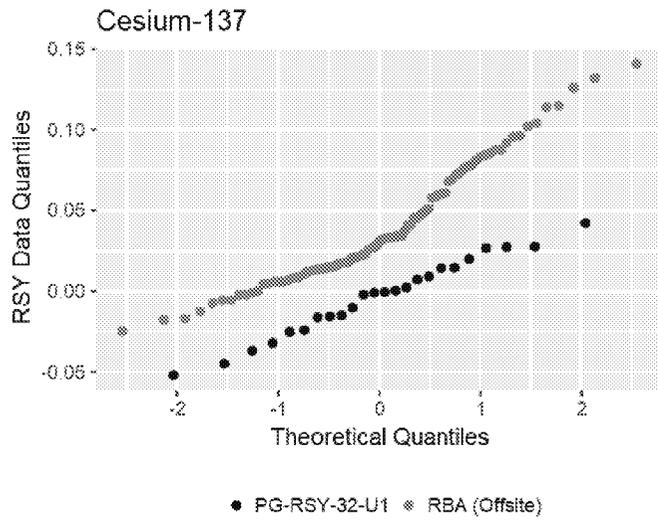


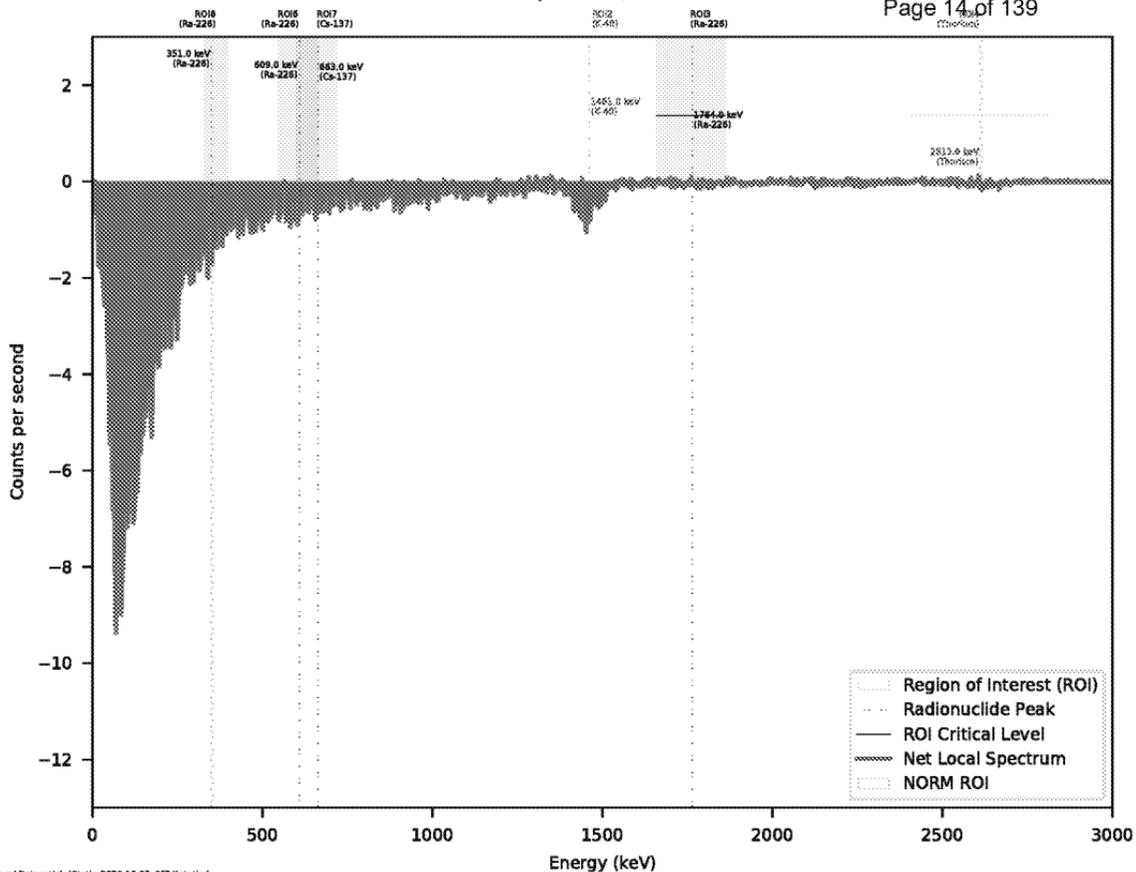
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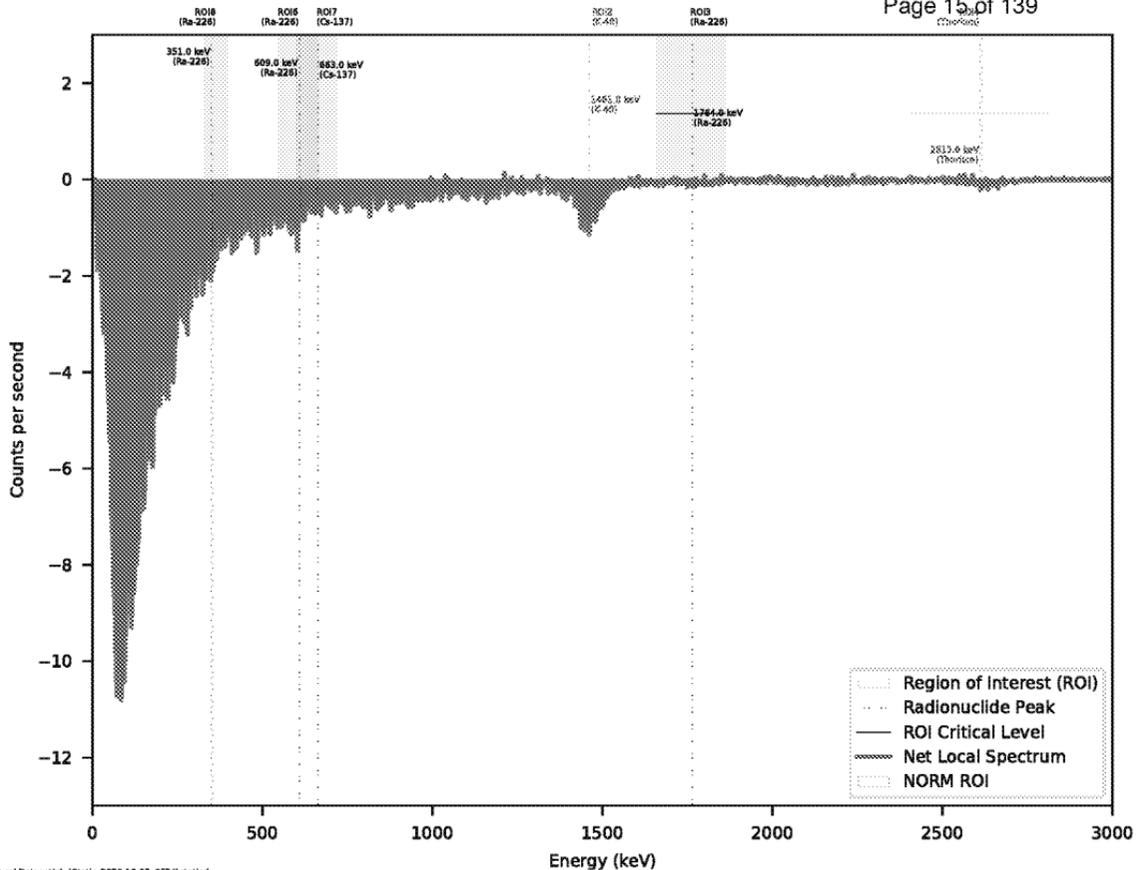


APTIM

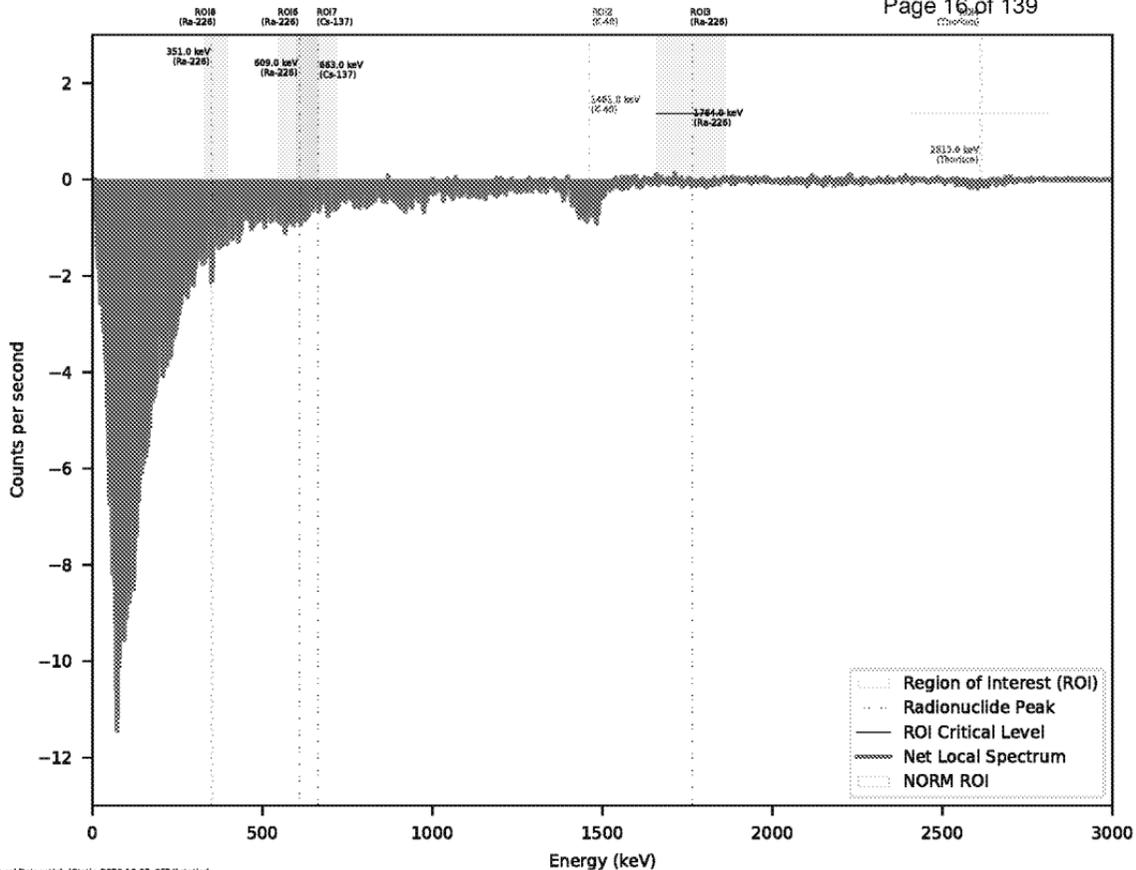
Soil Sample Statistics

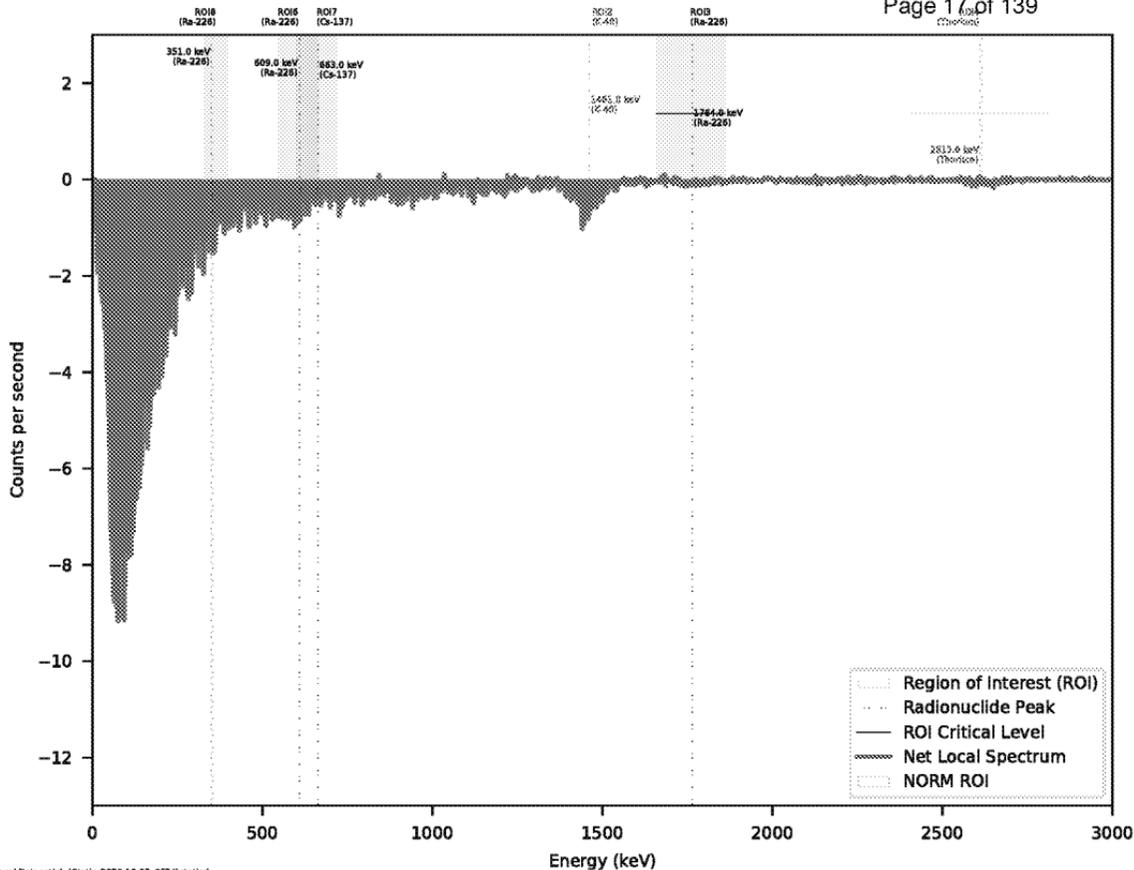


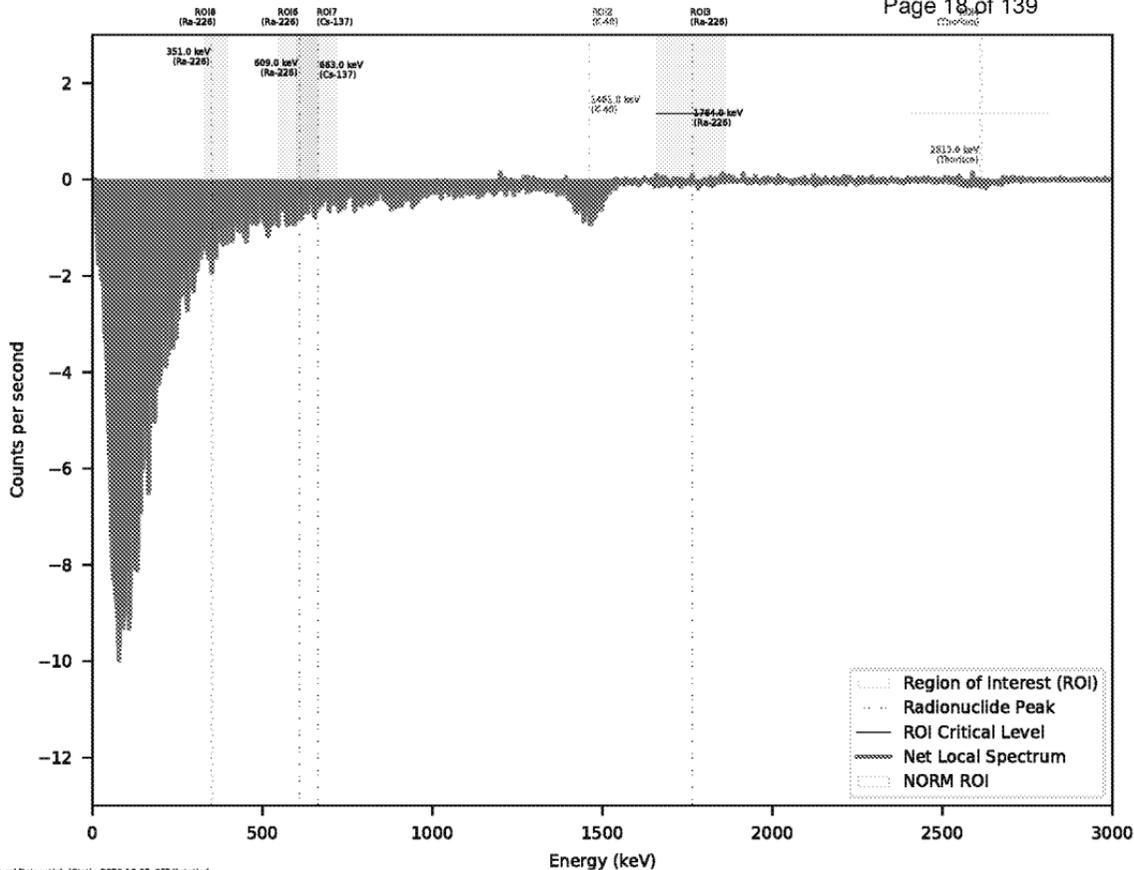


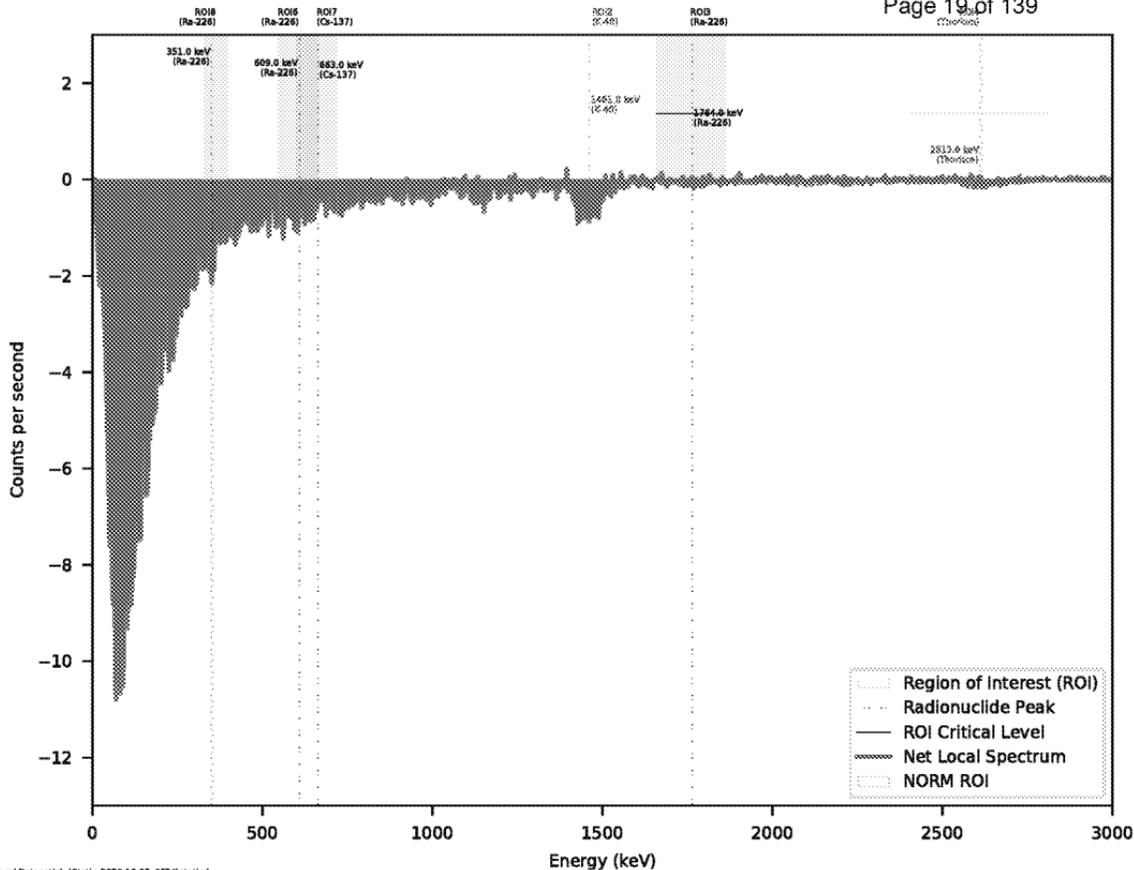


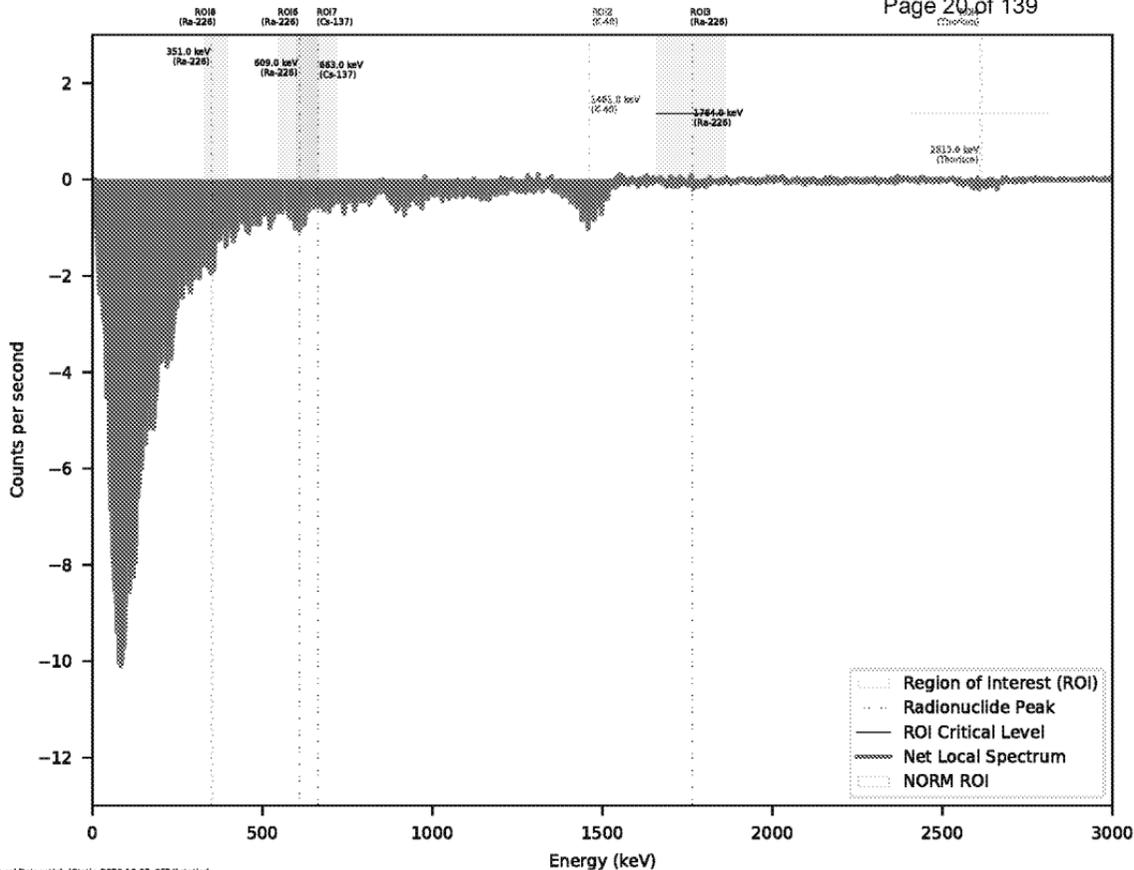
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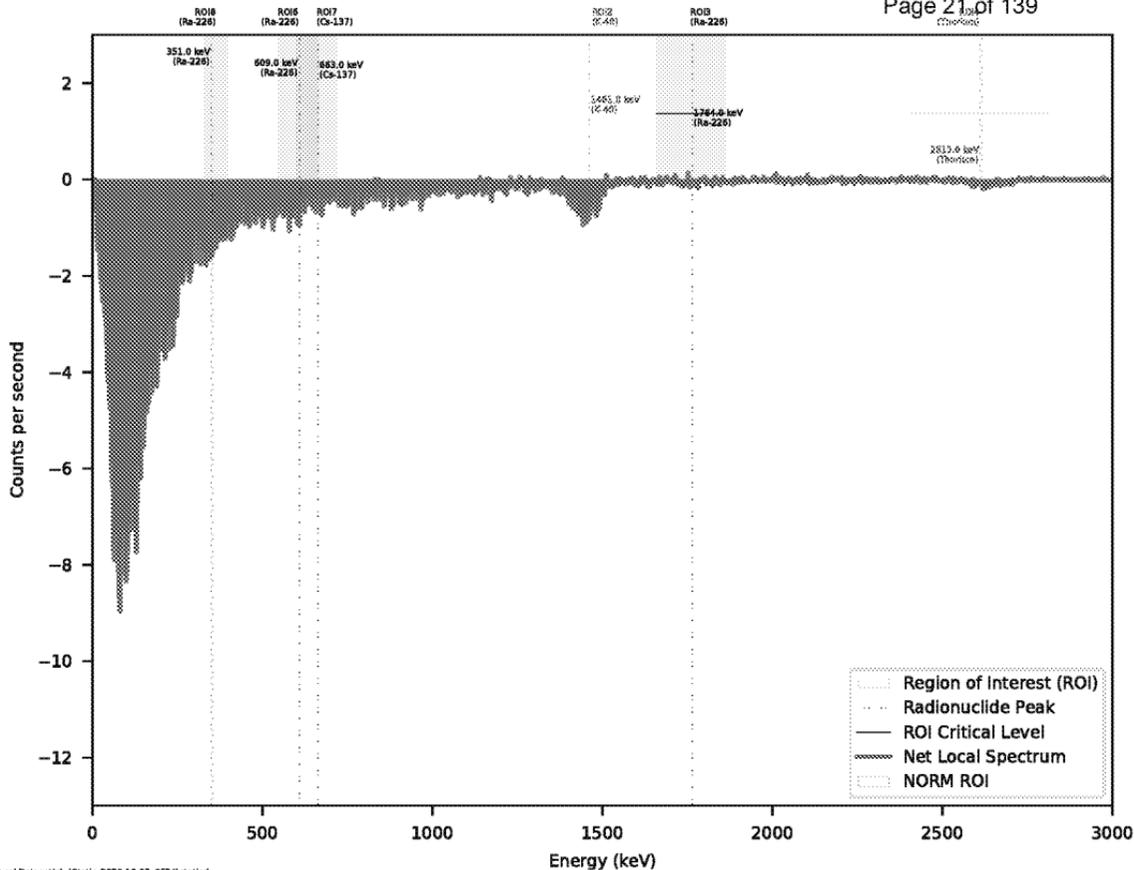


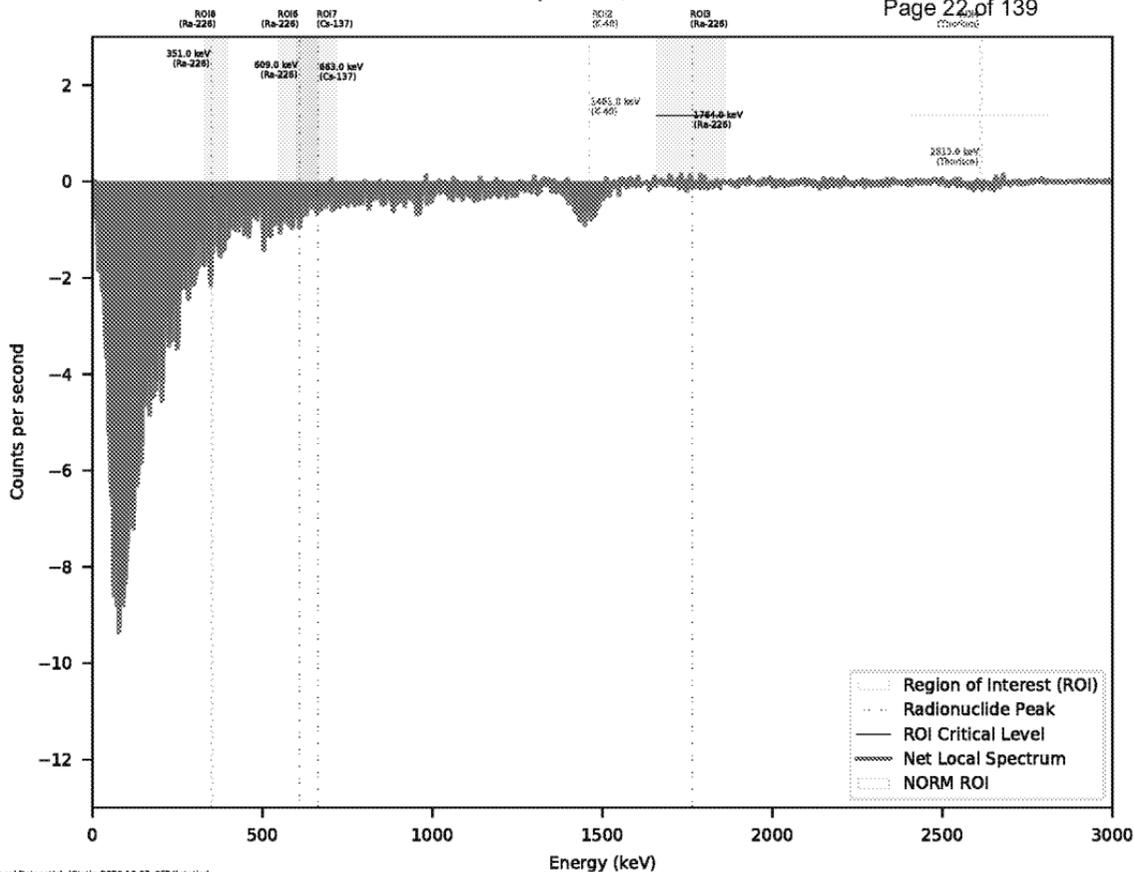


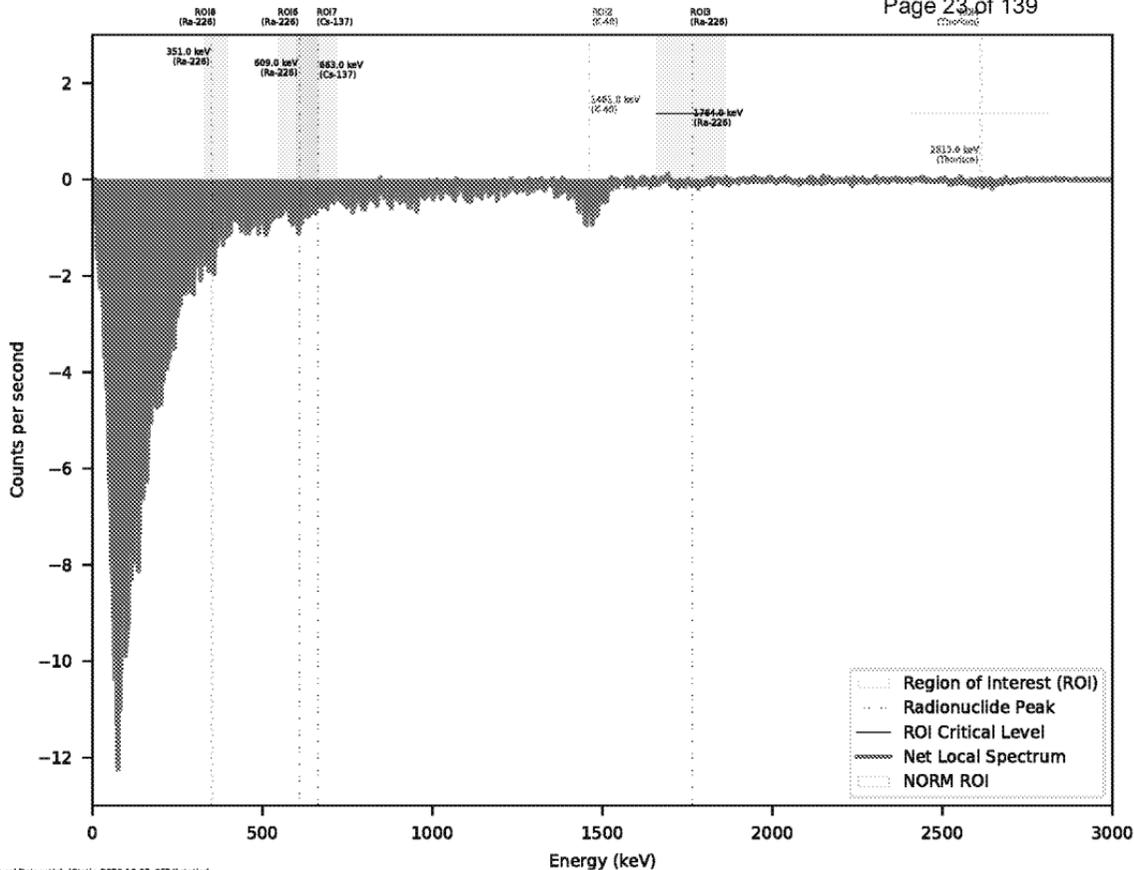


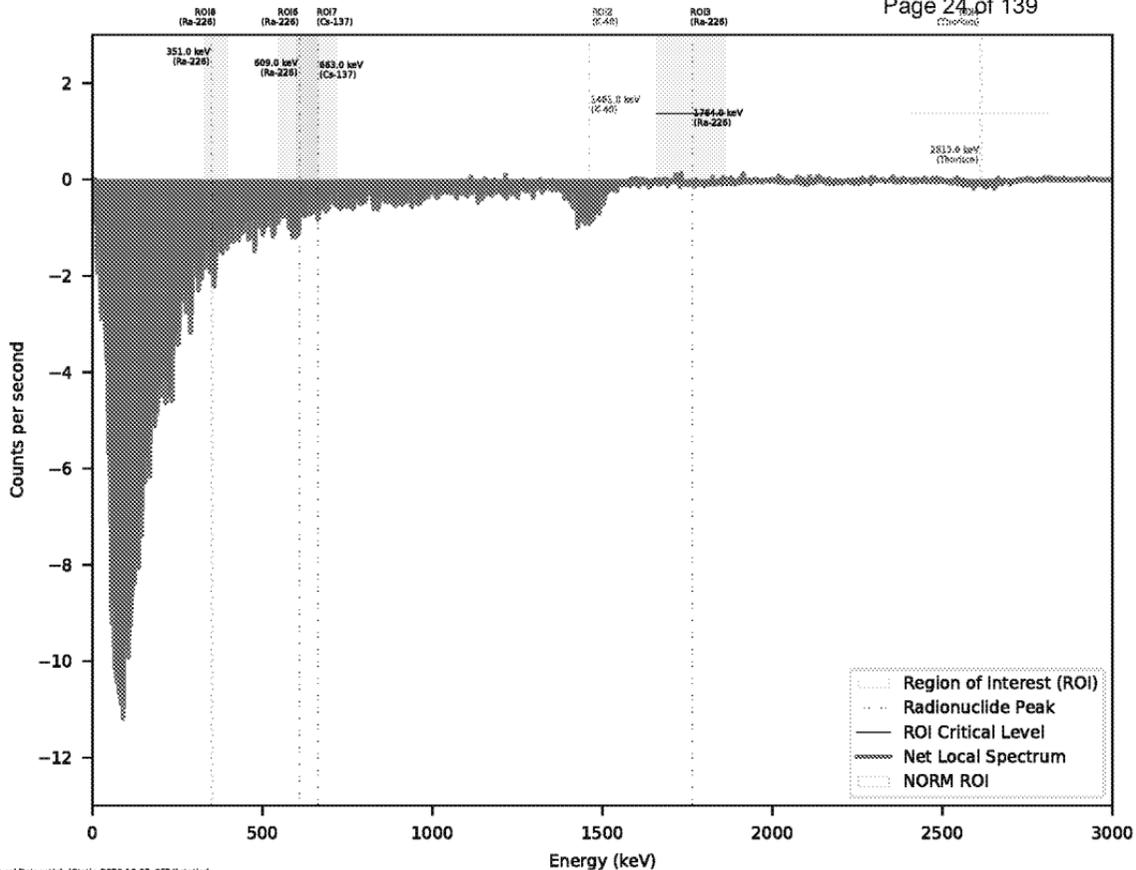


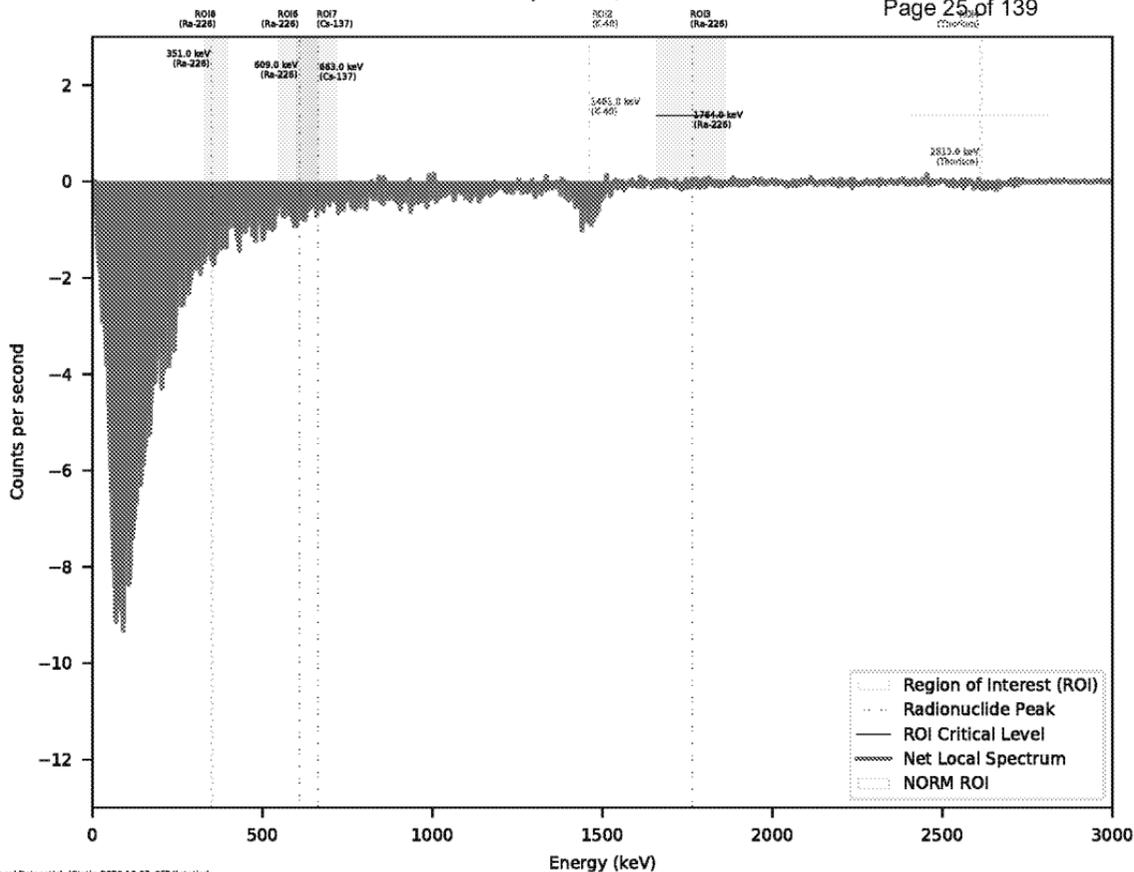


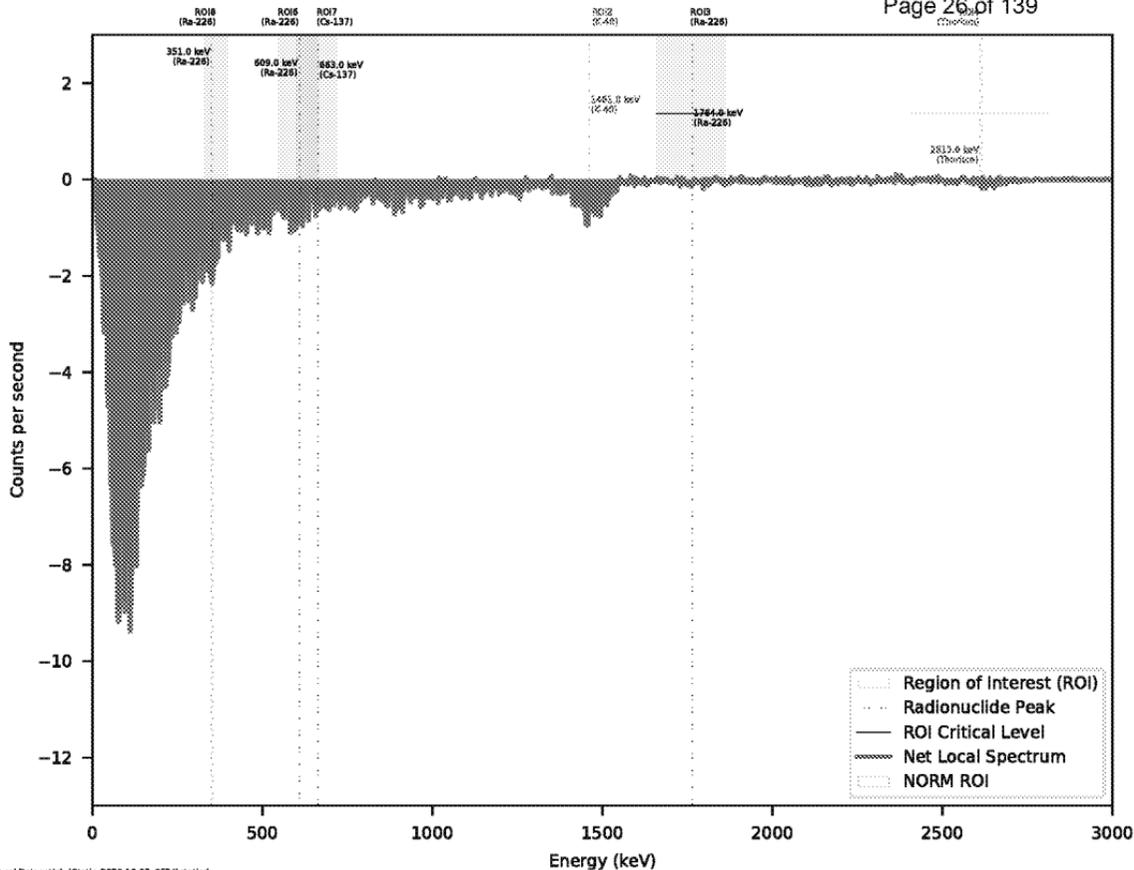


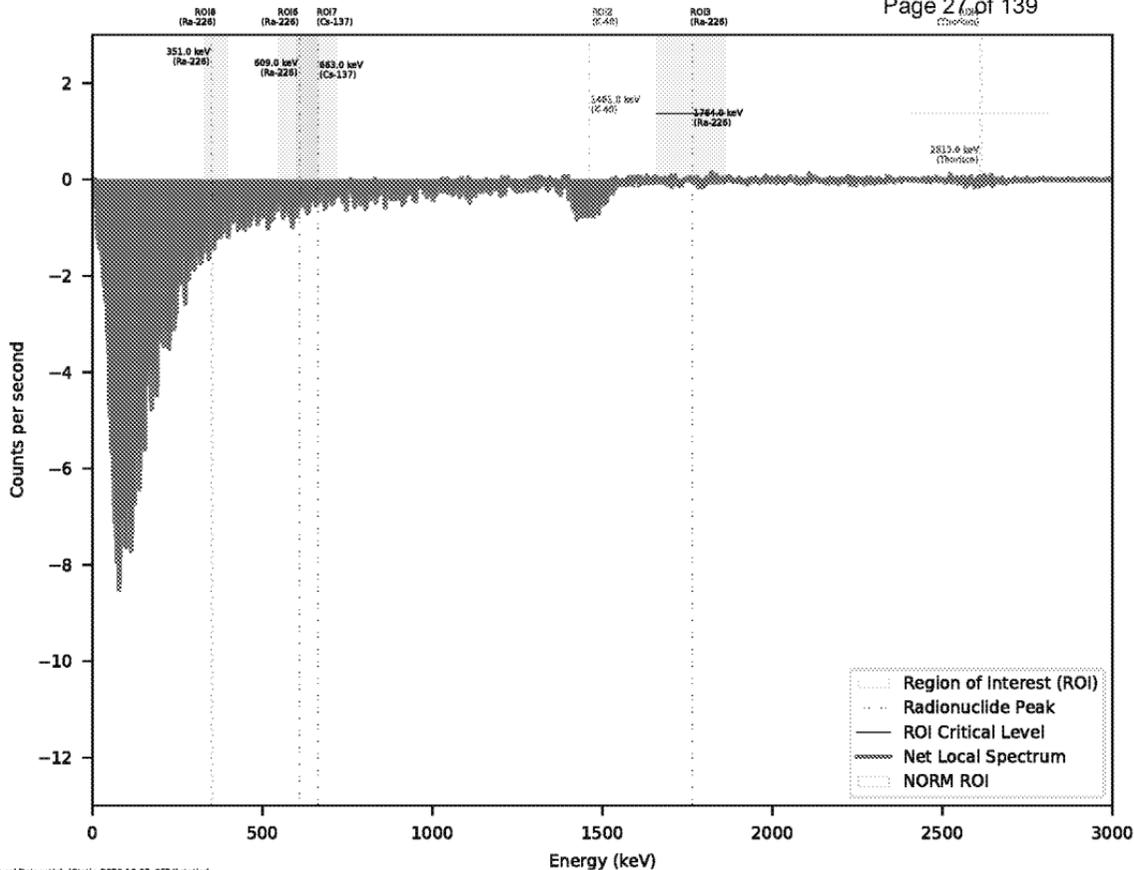


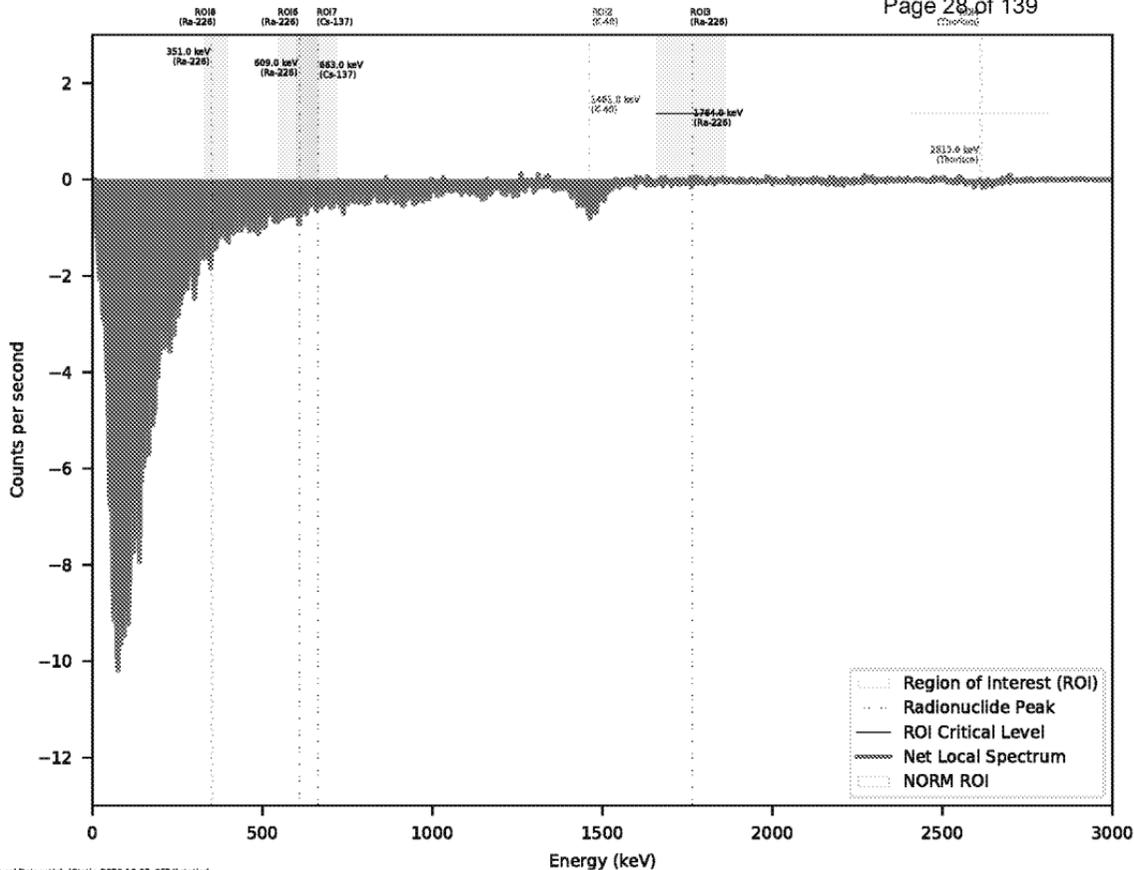


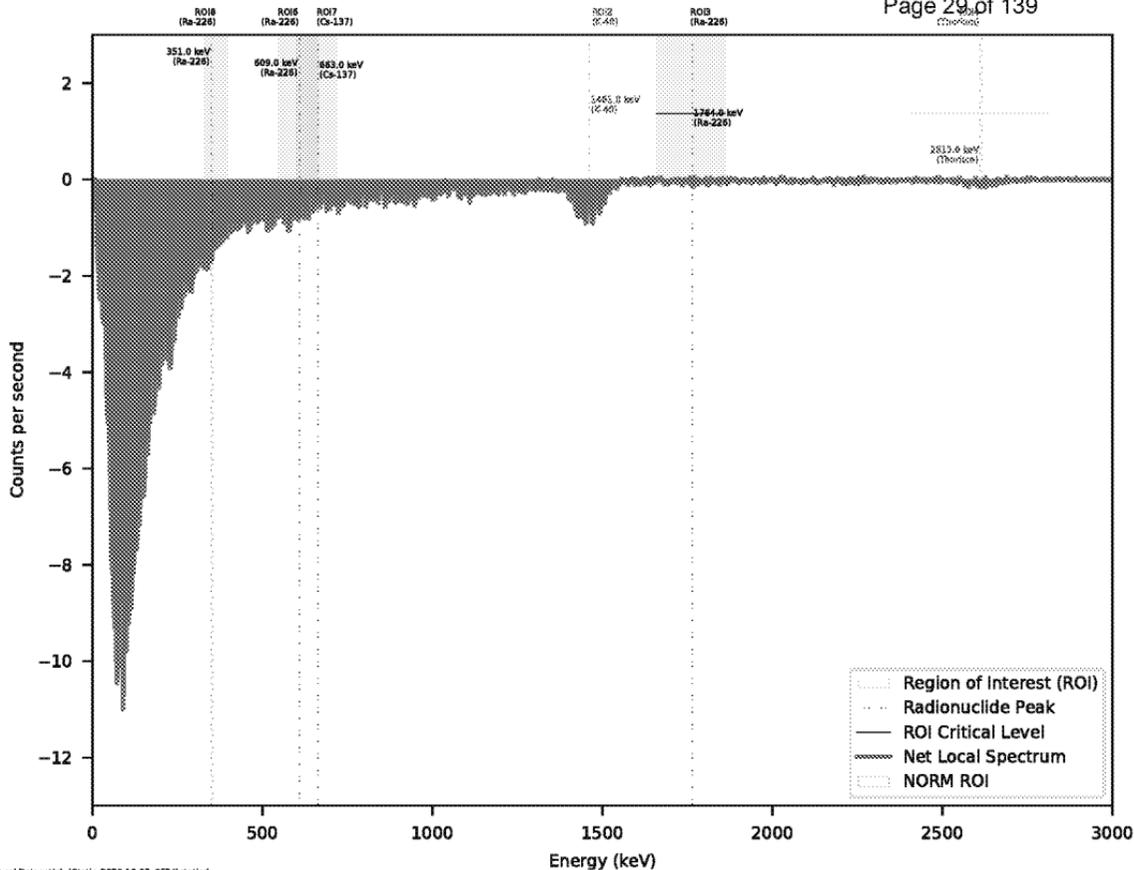


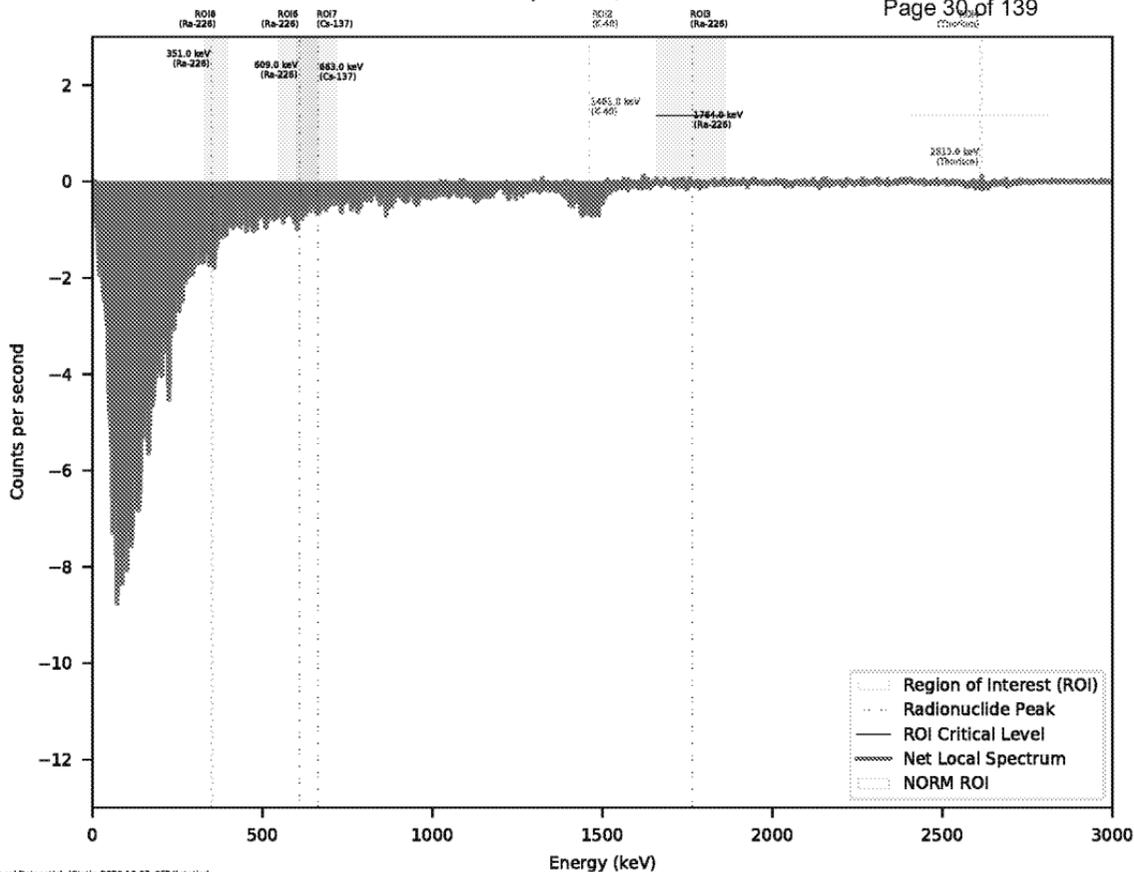


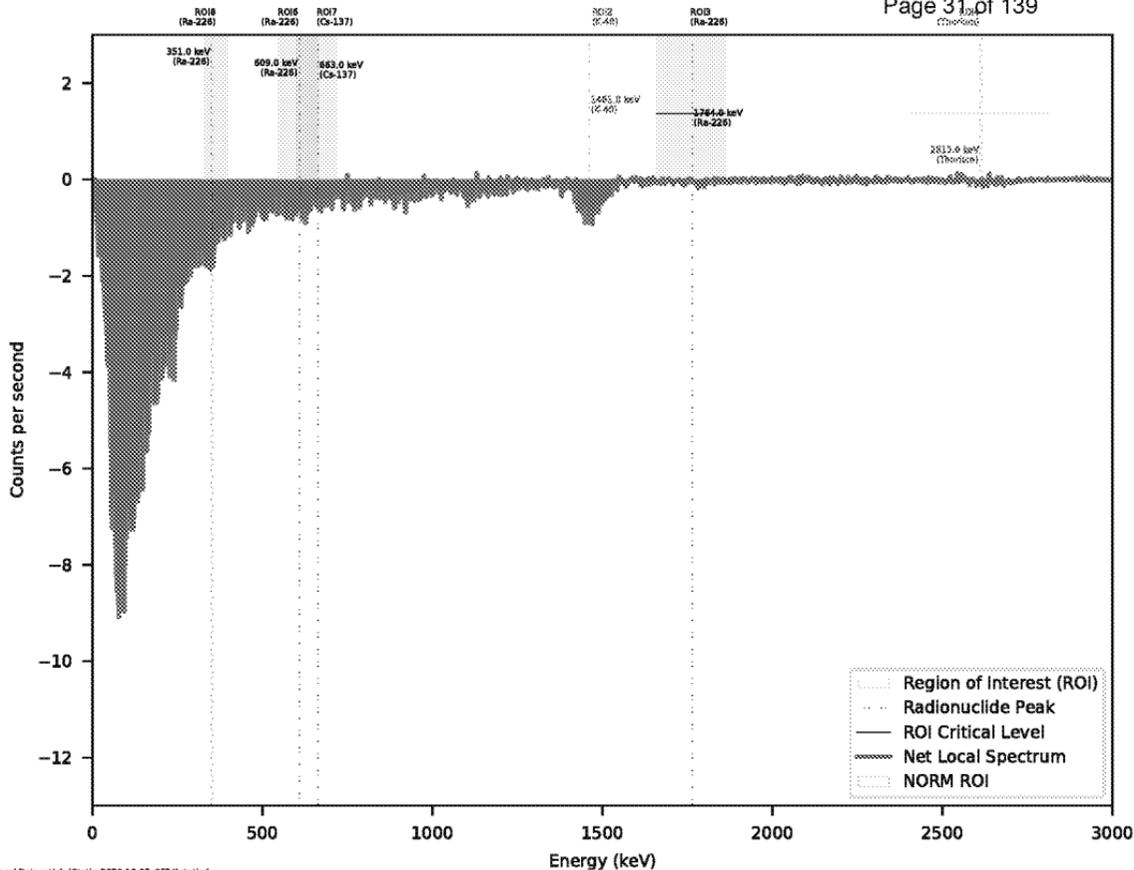


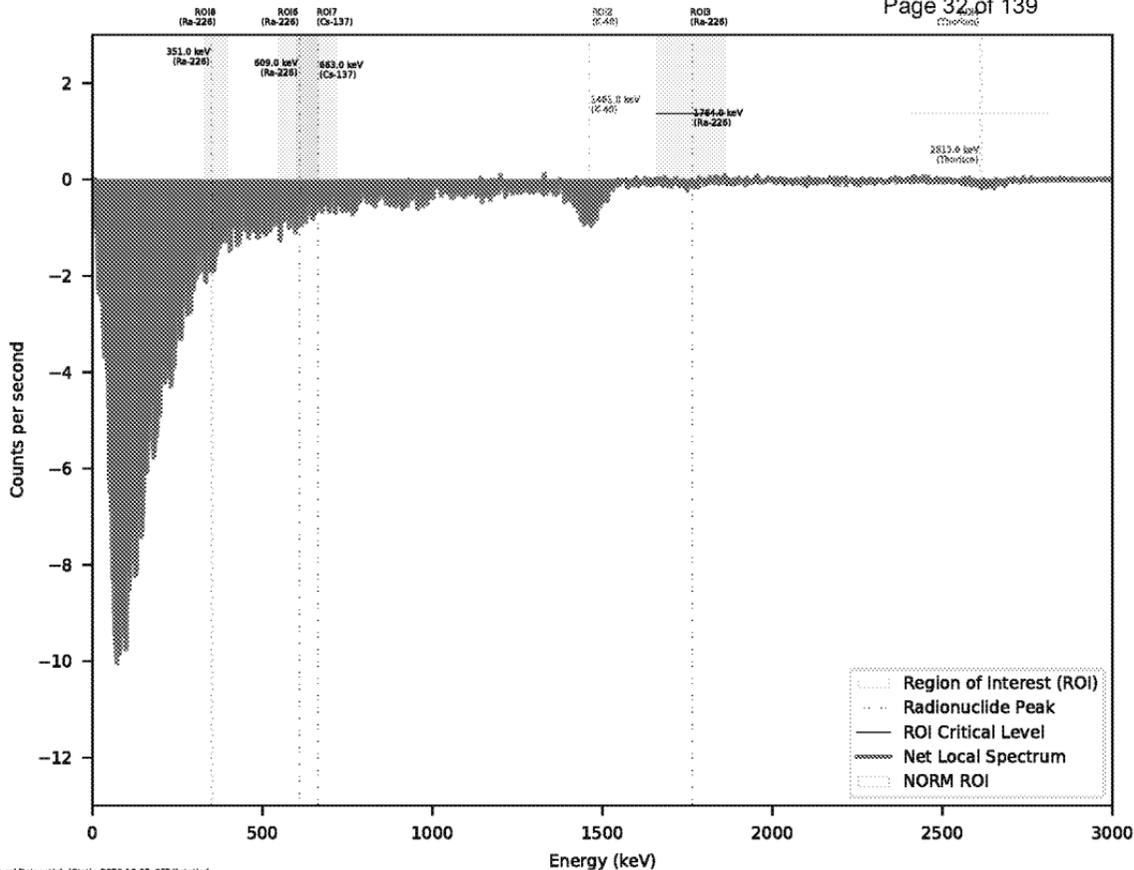


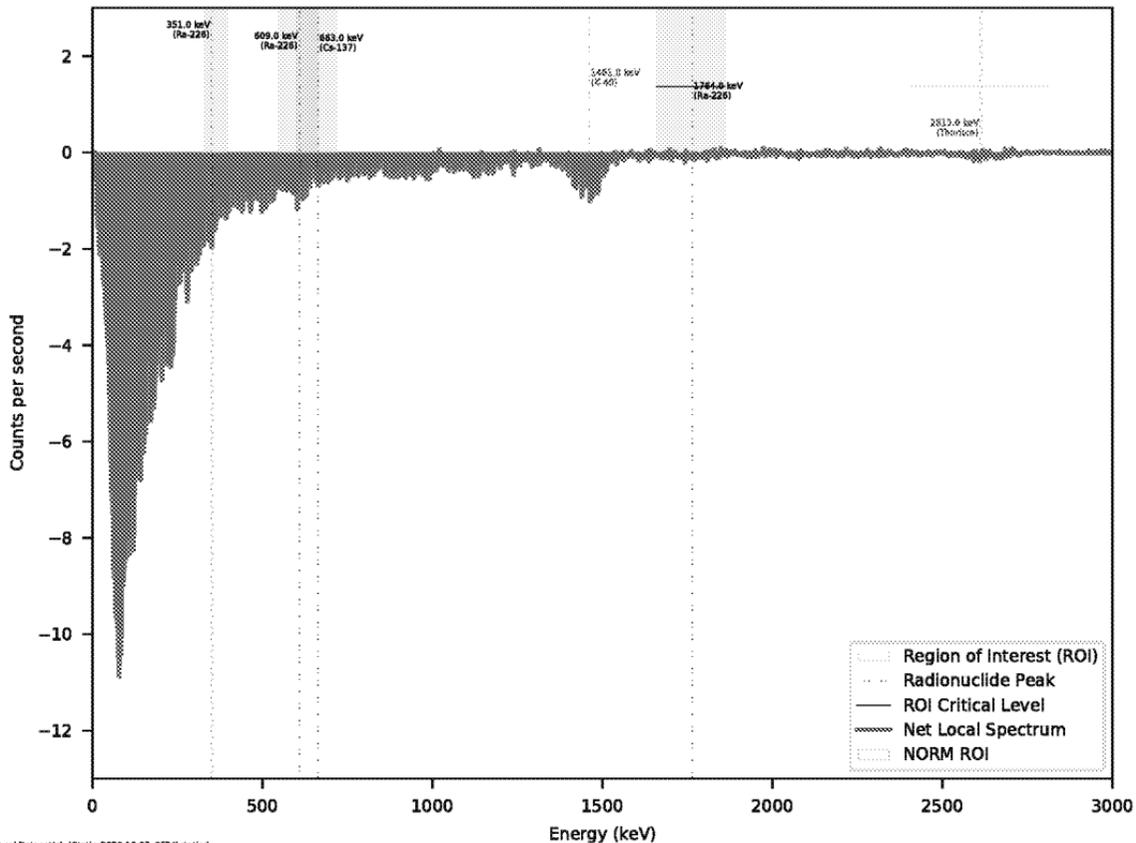


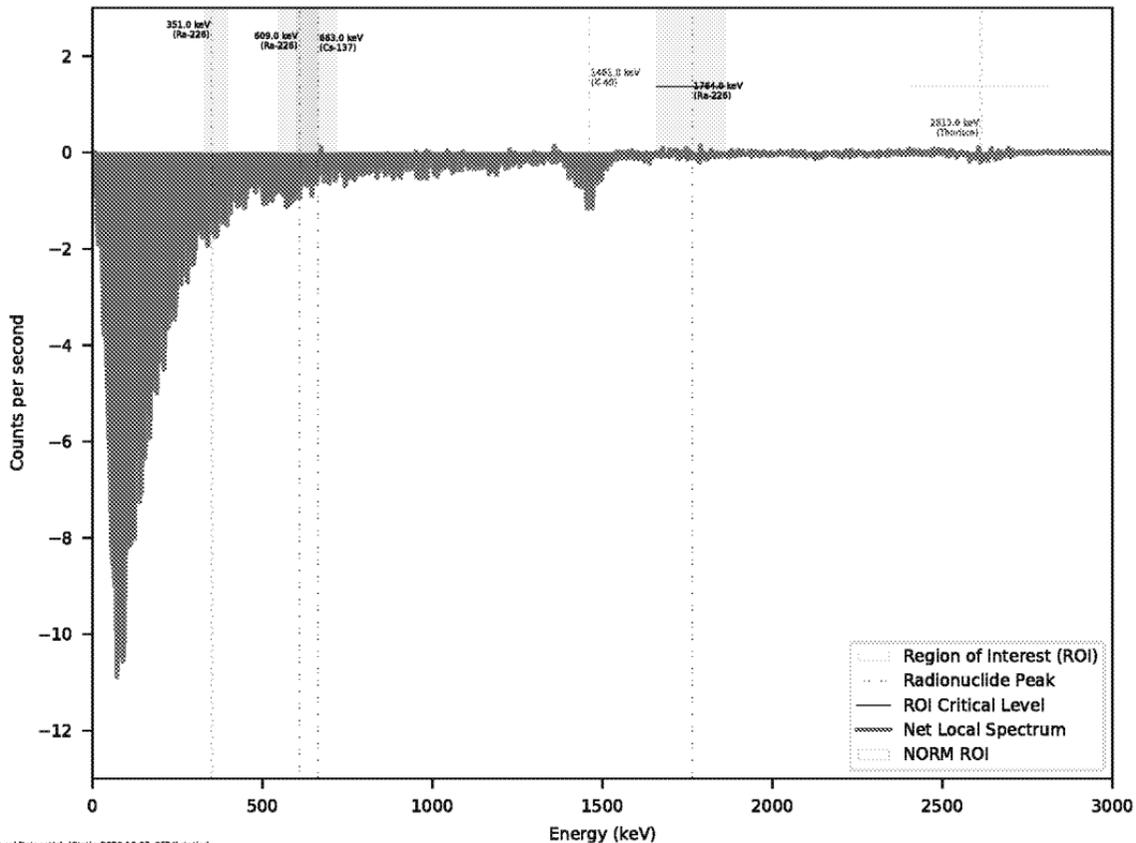


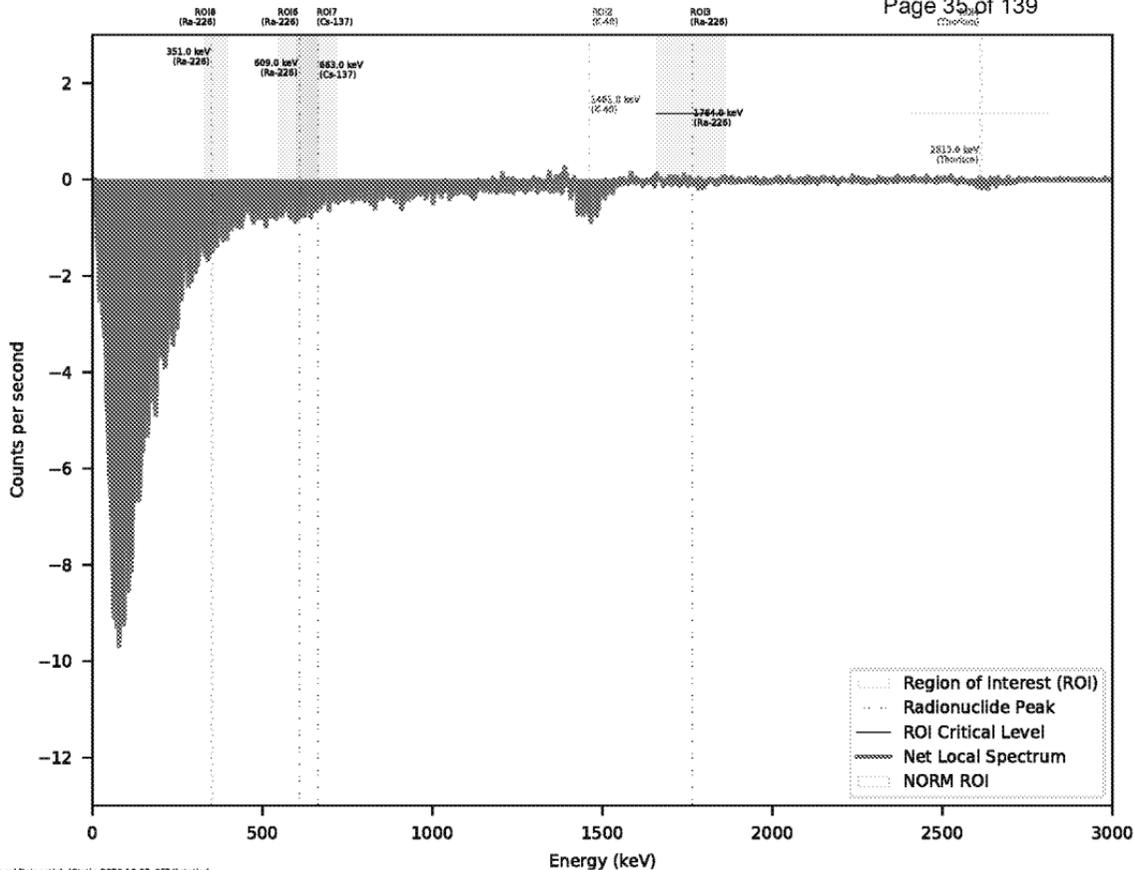


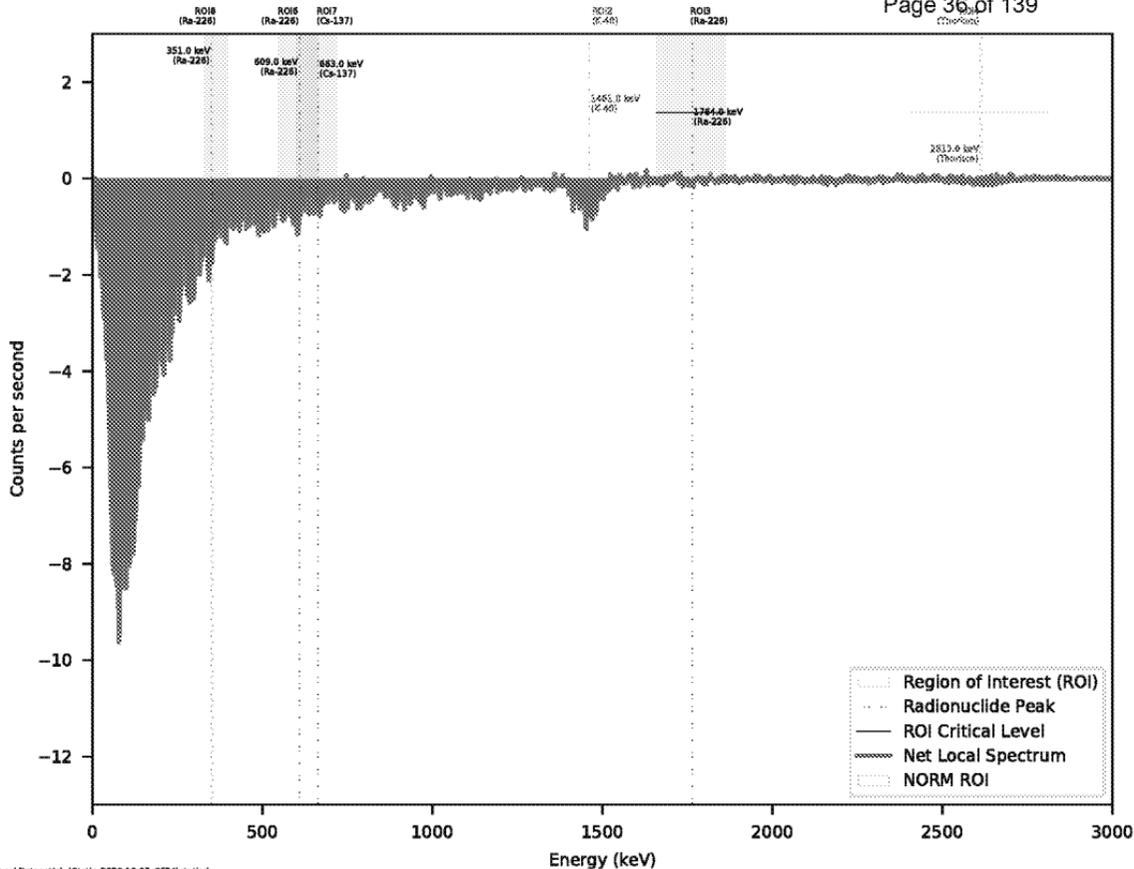


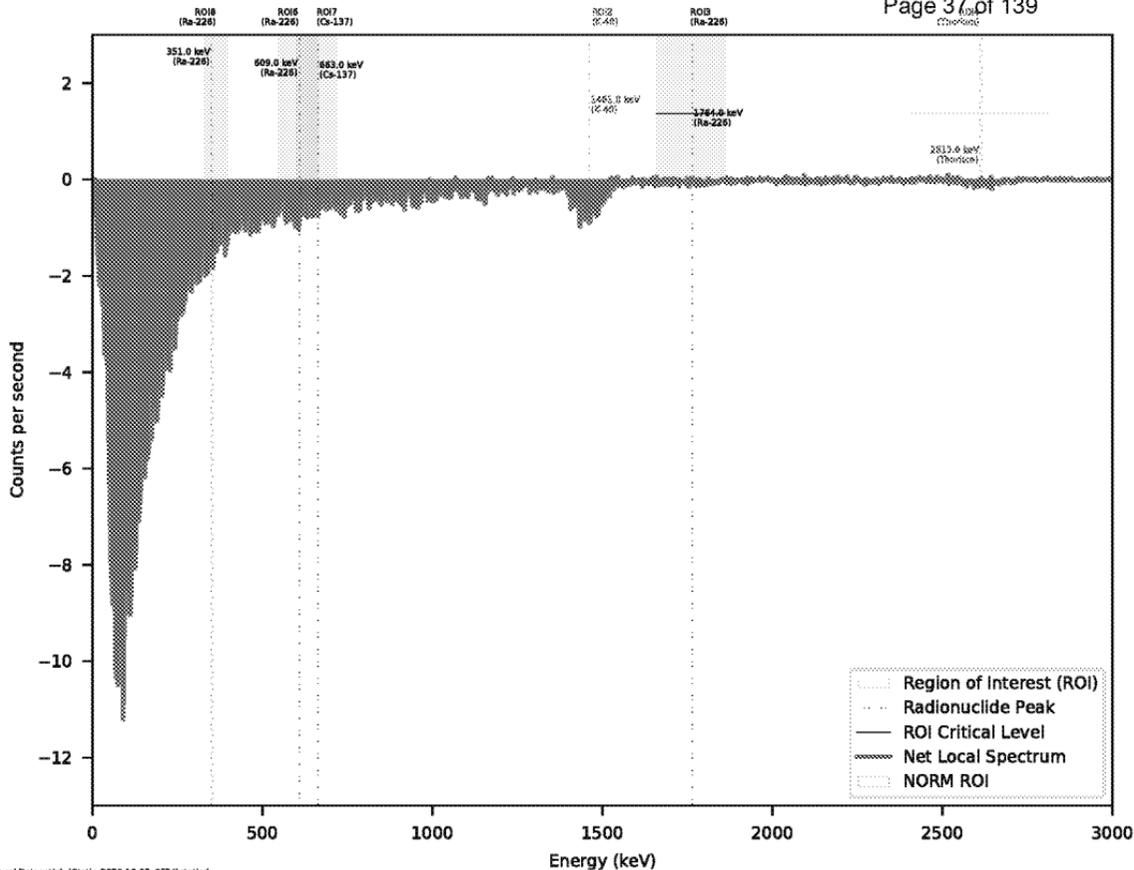


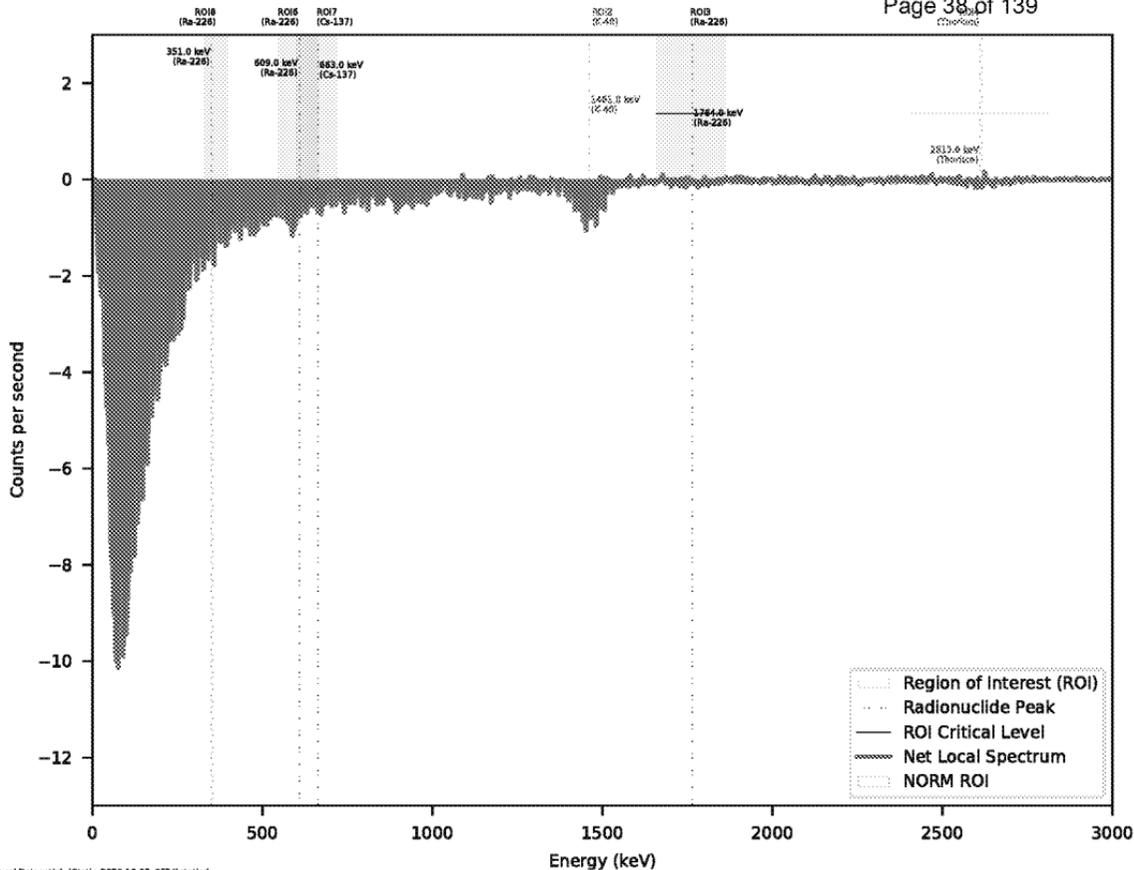


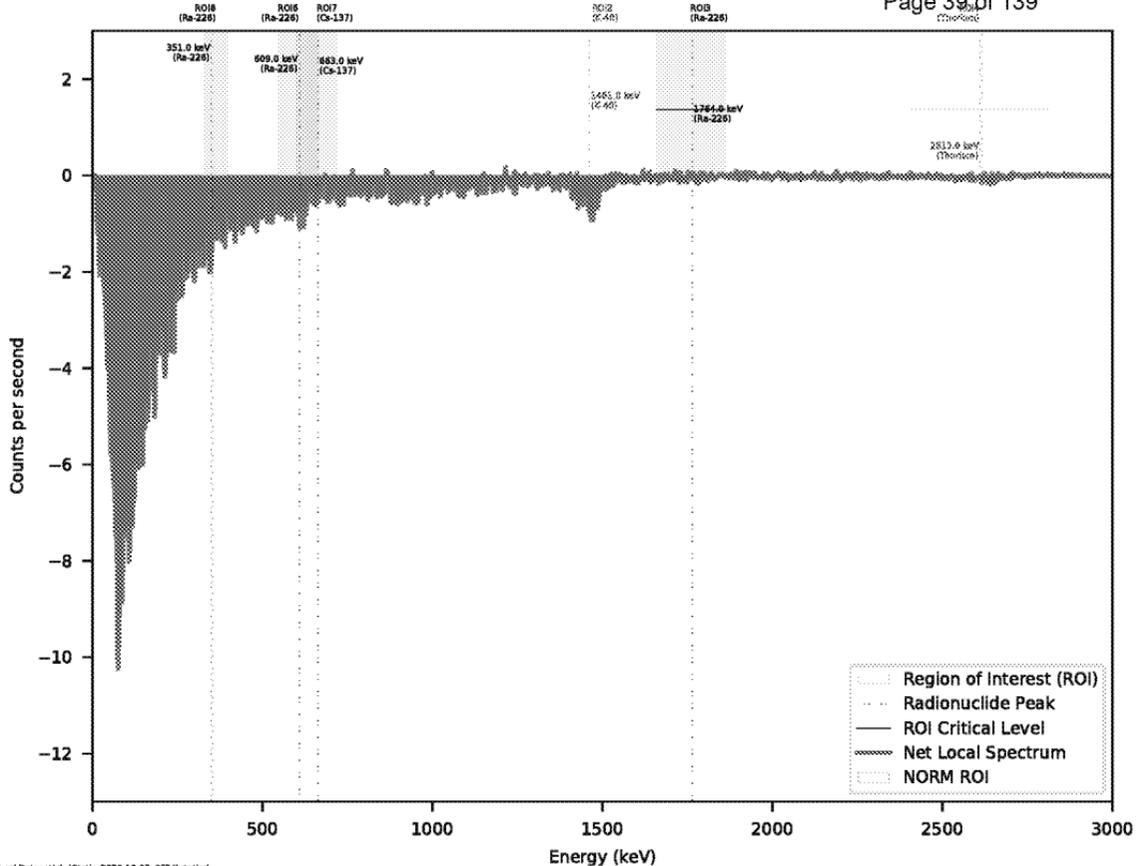


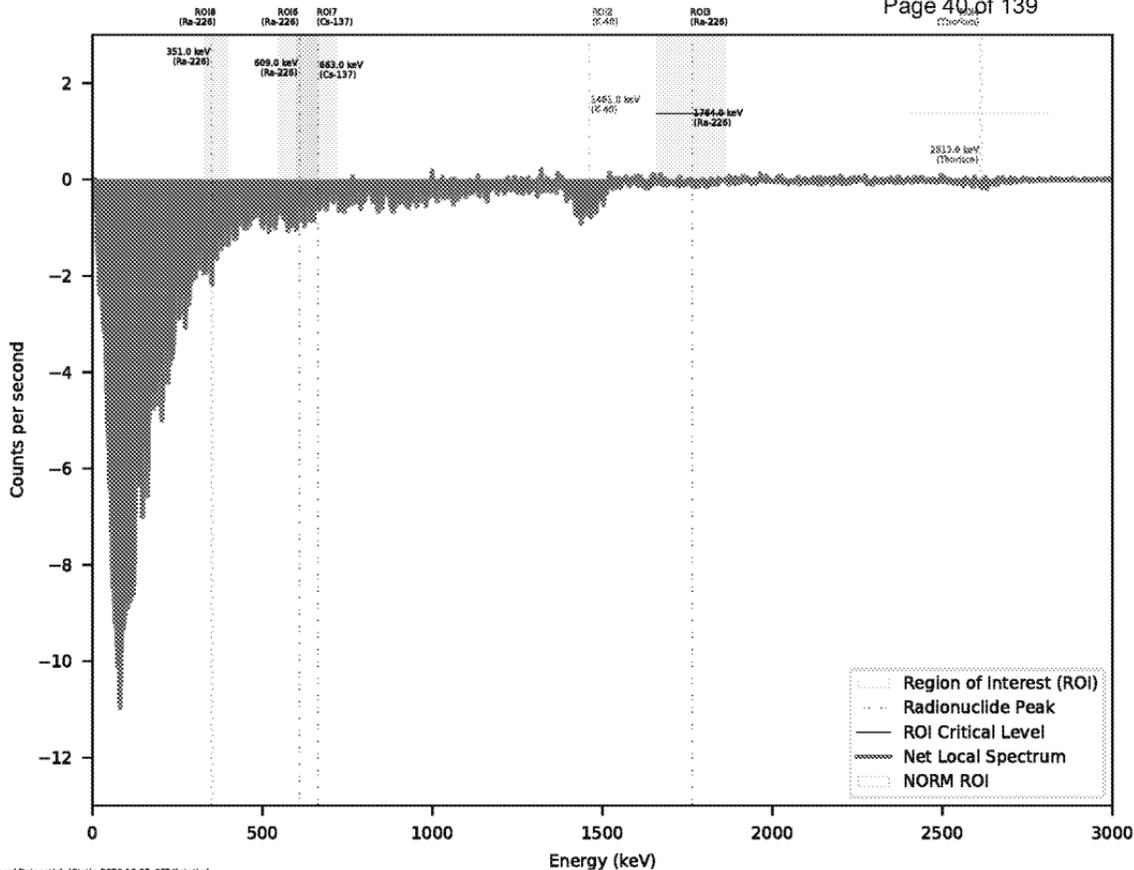


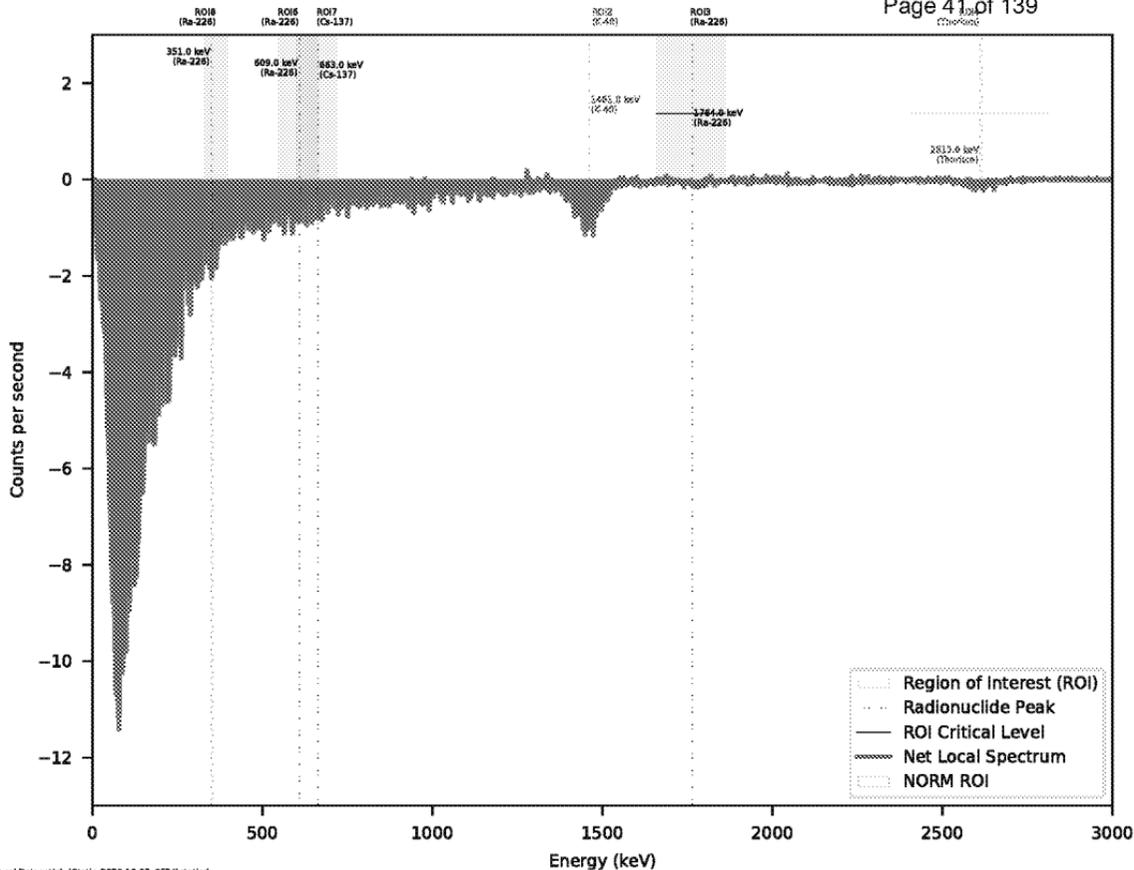


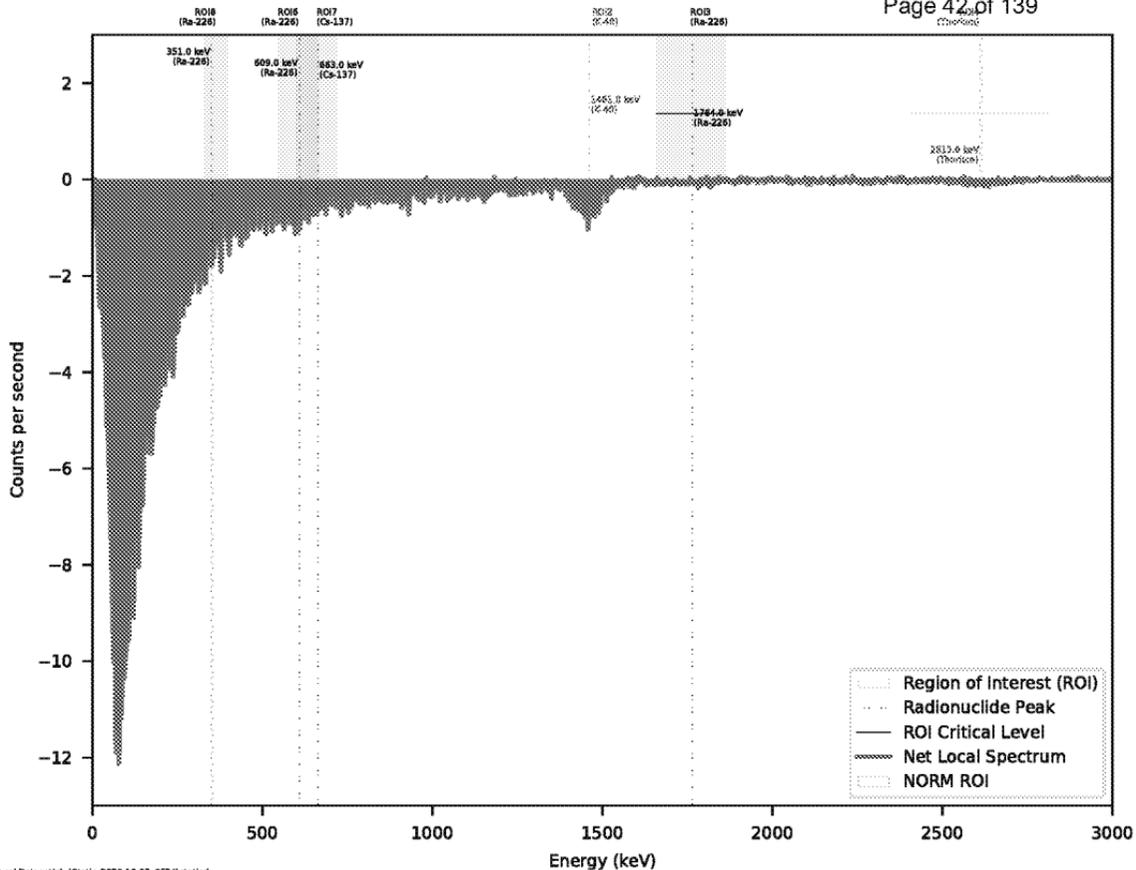


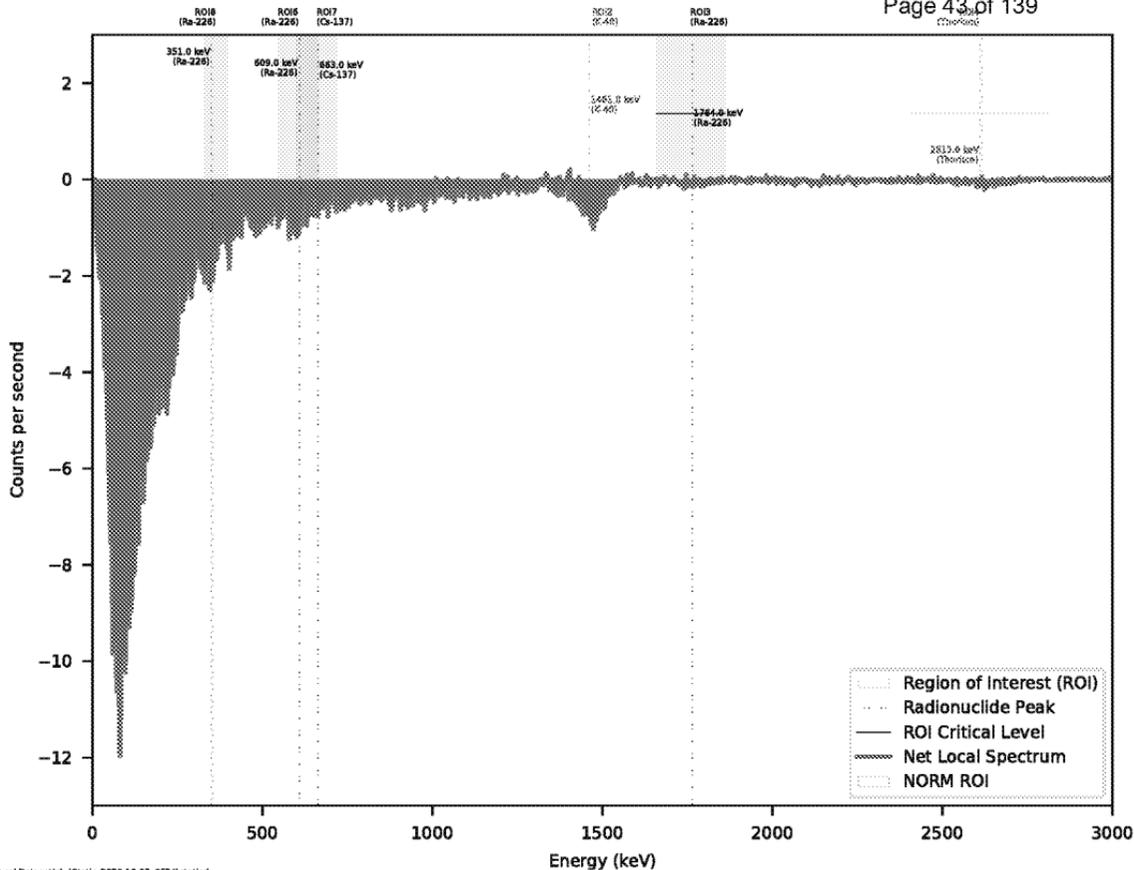


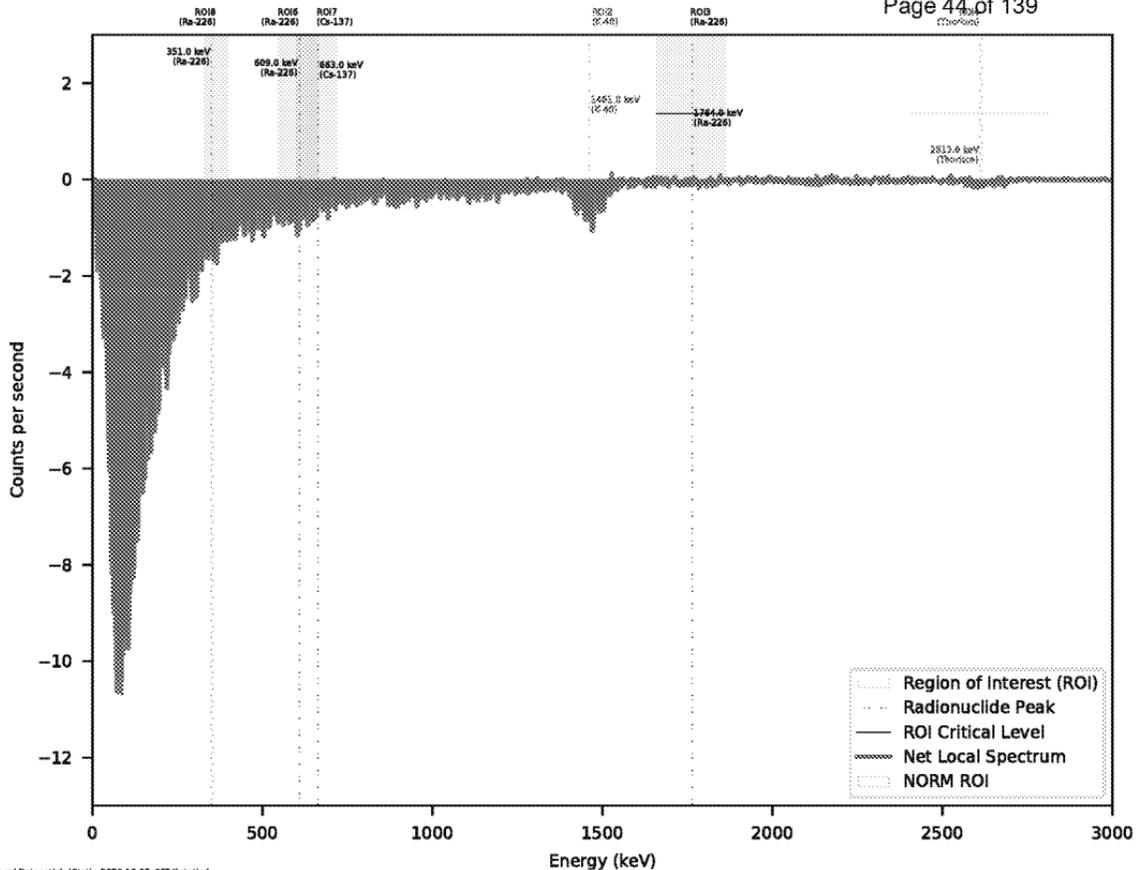


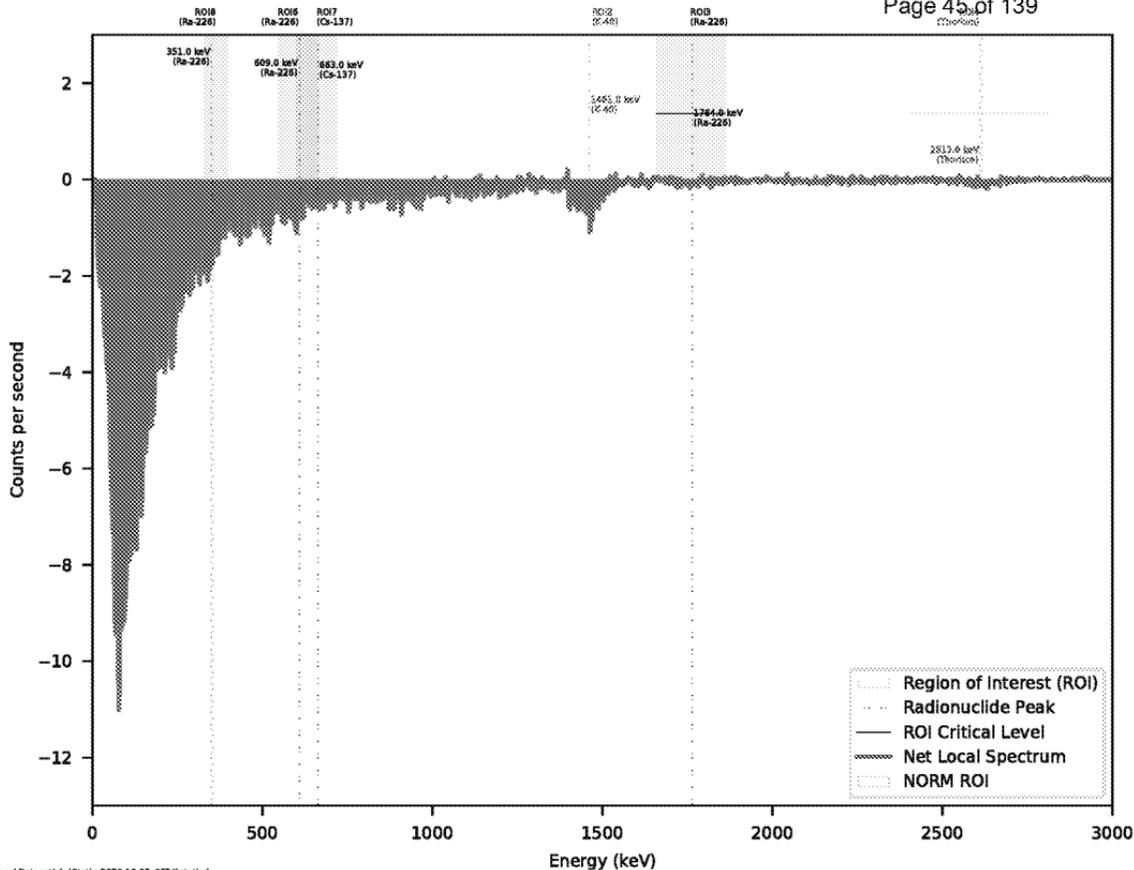


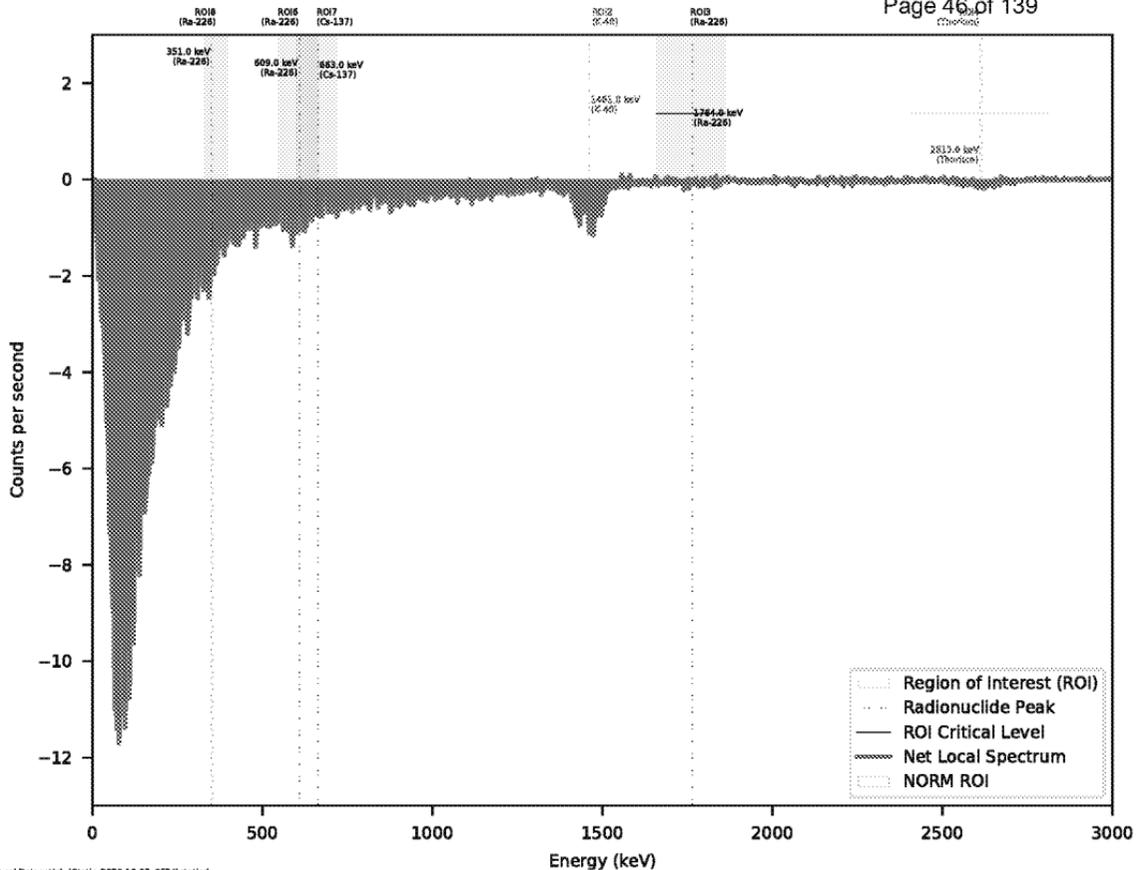


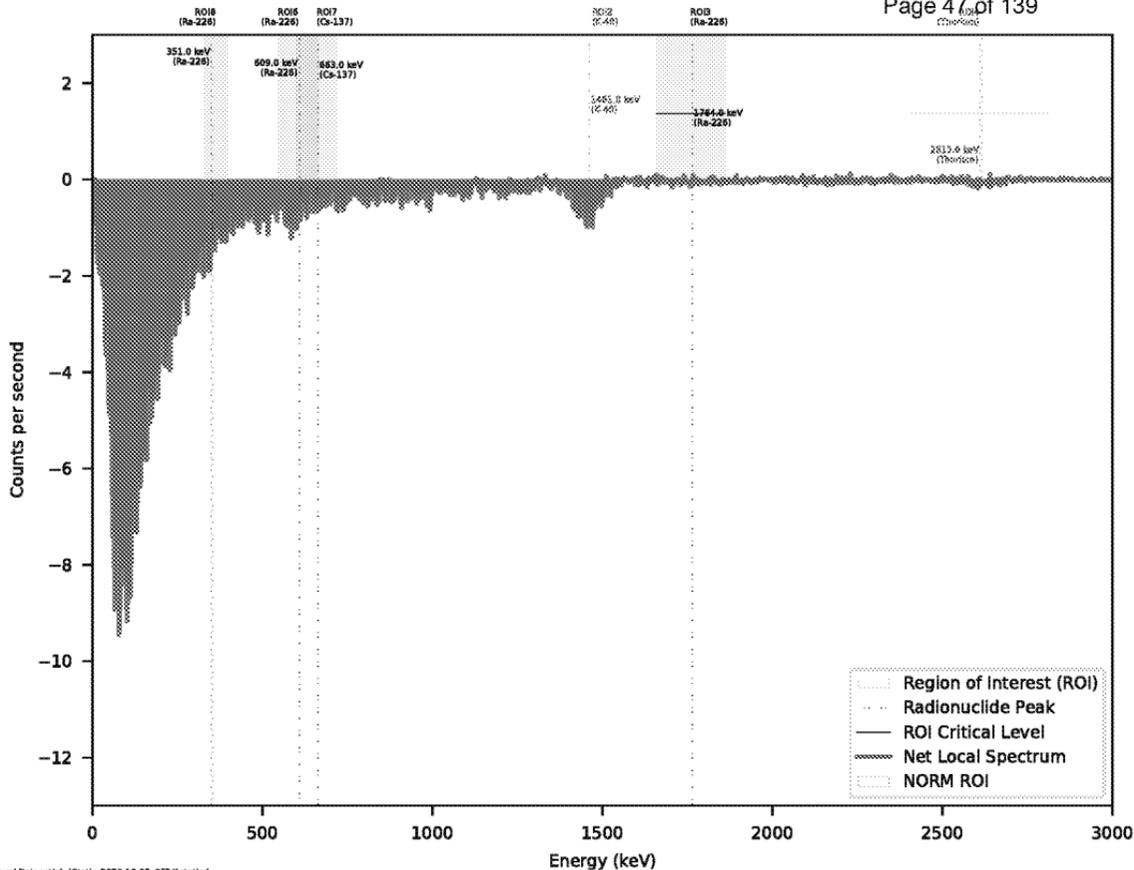


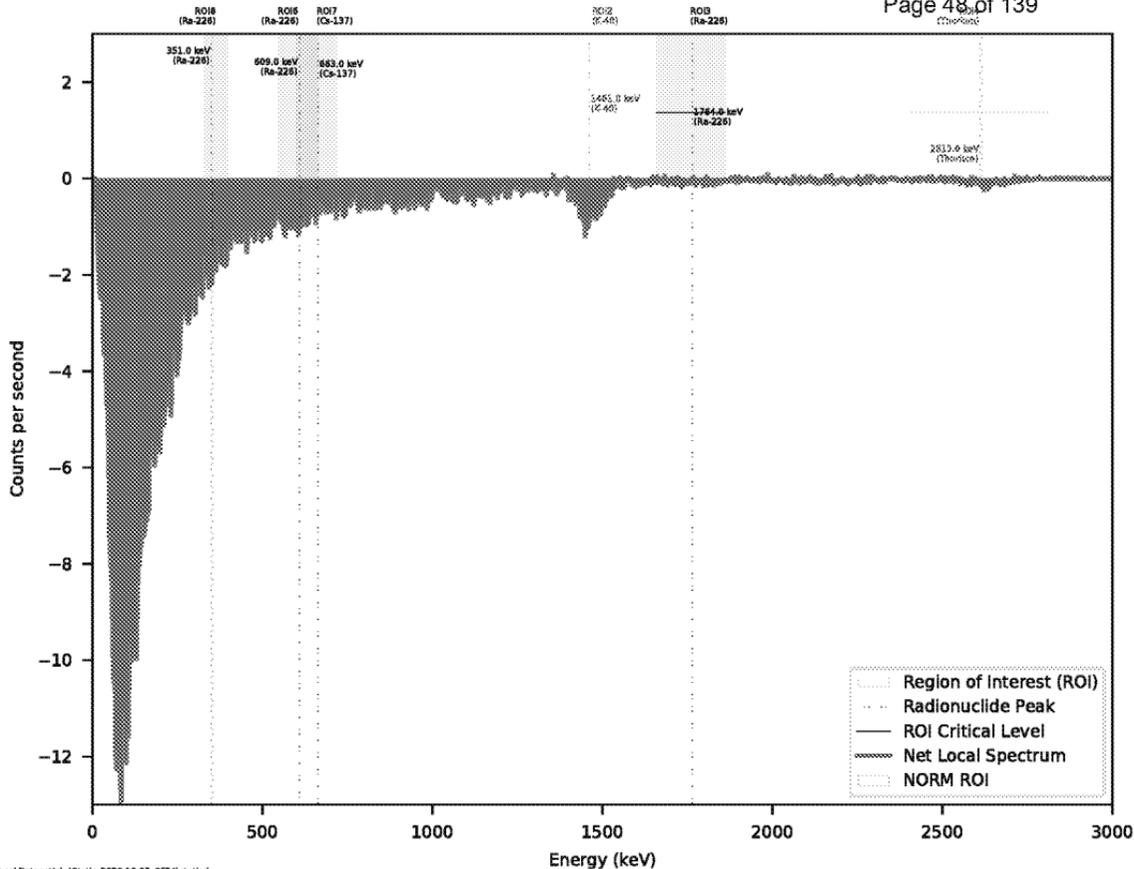


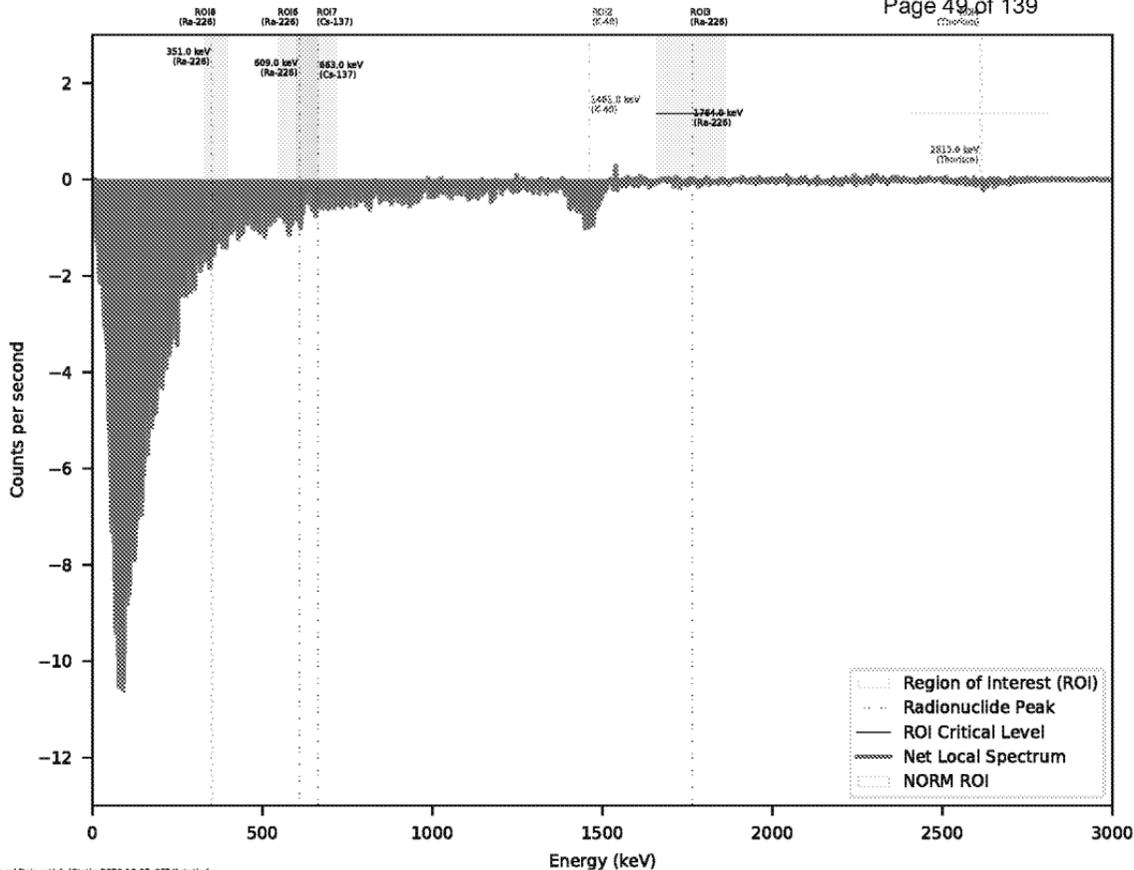


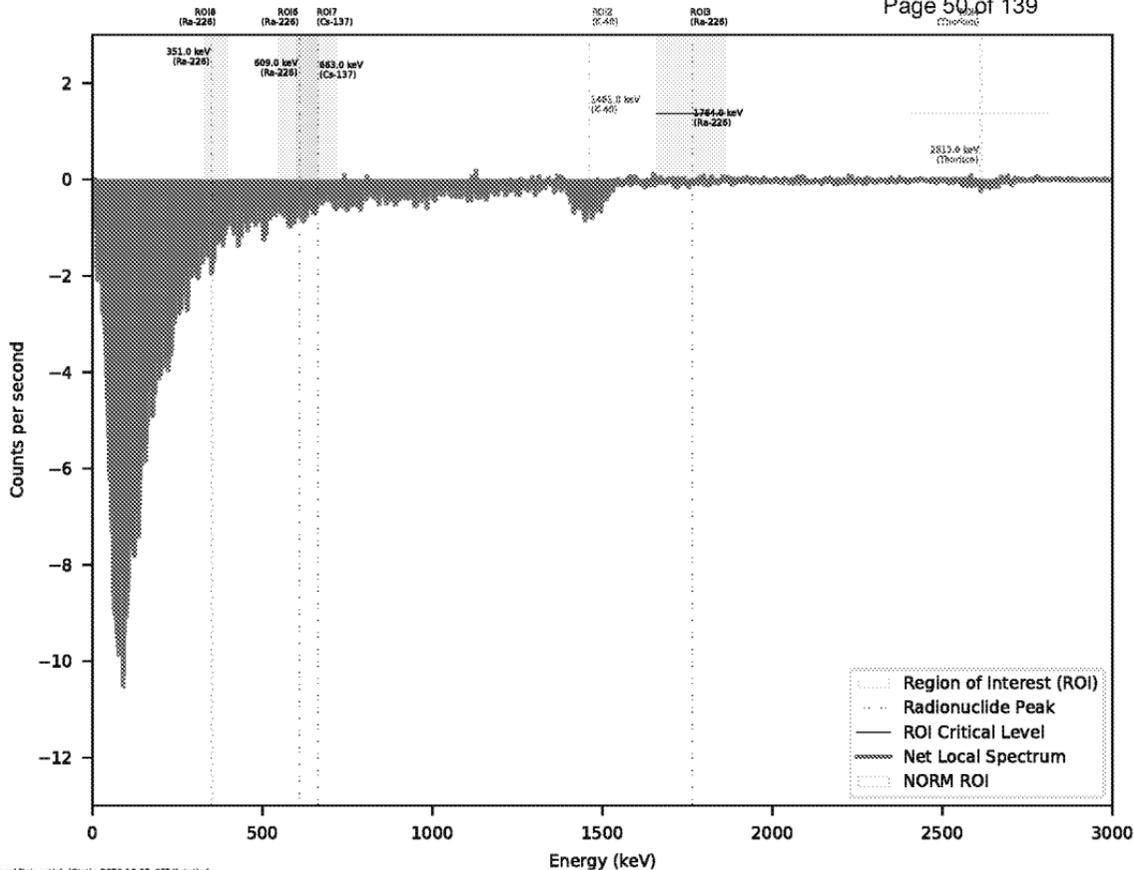


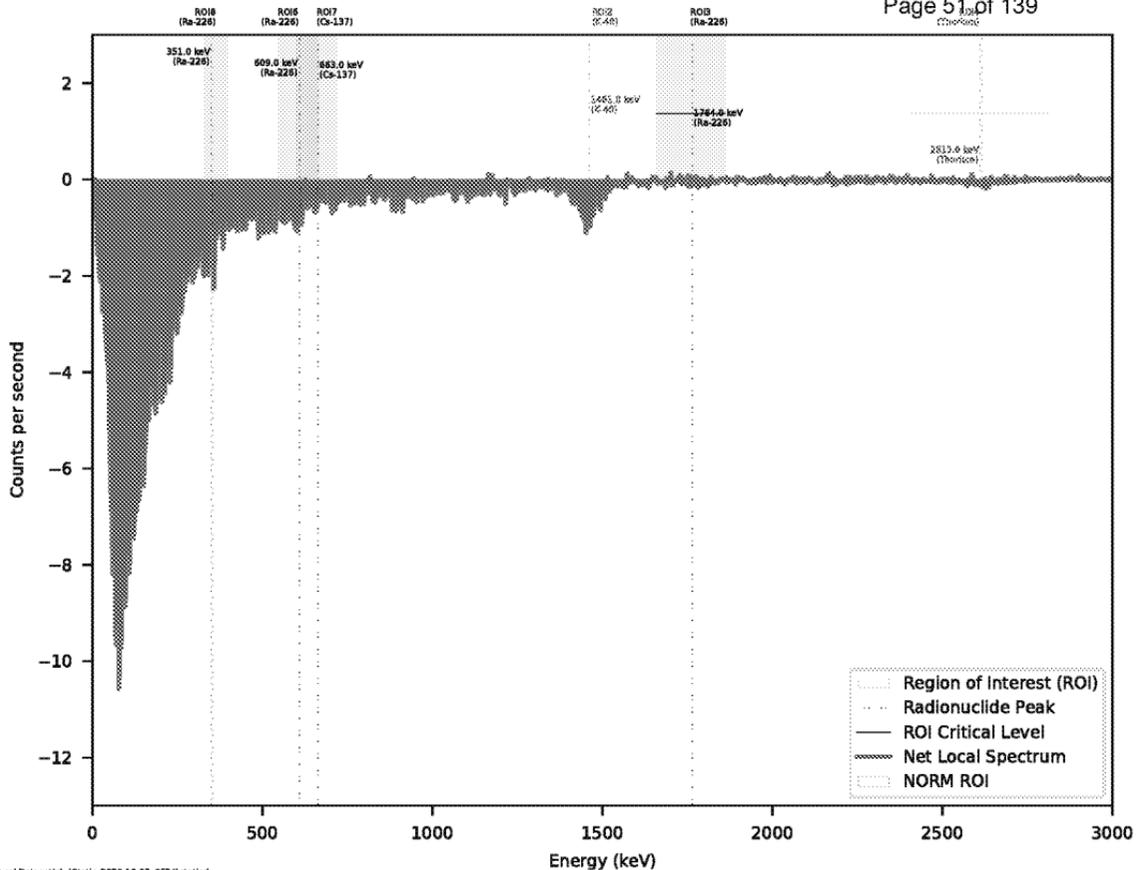


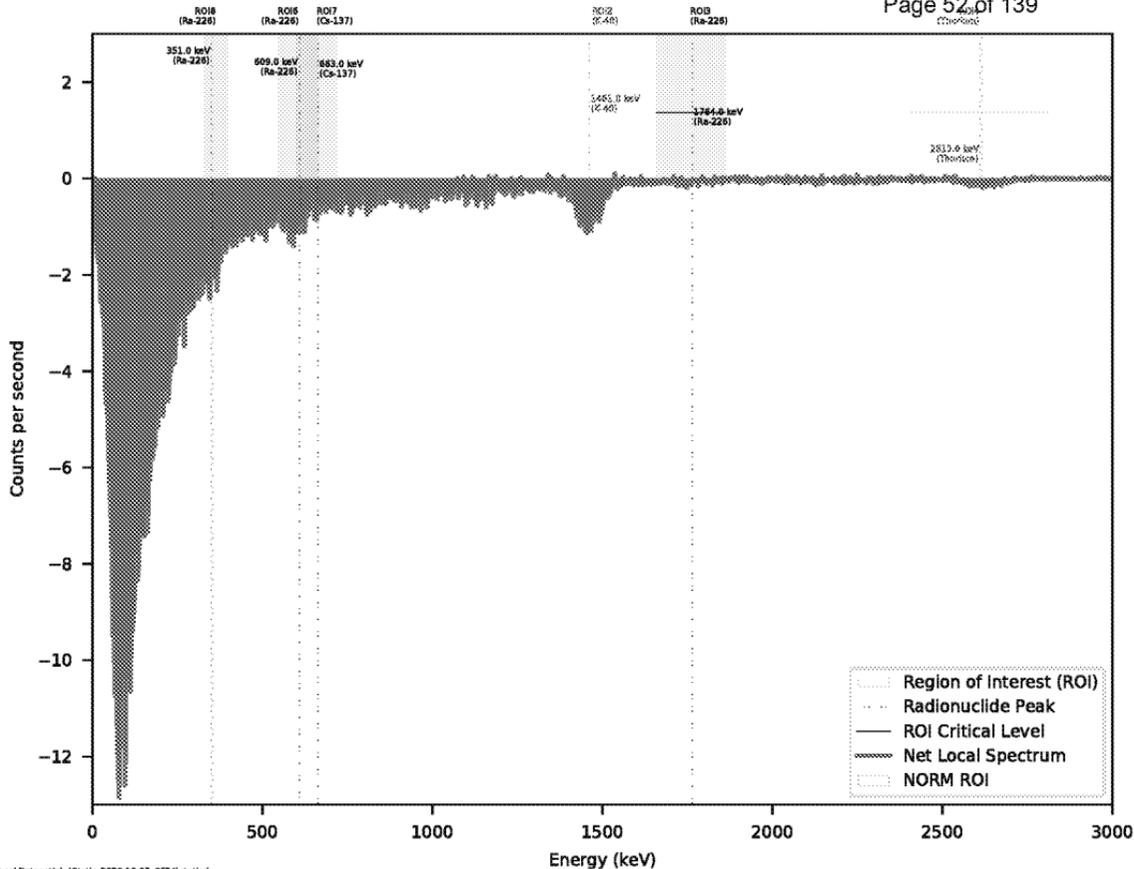


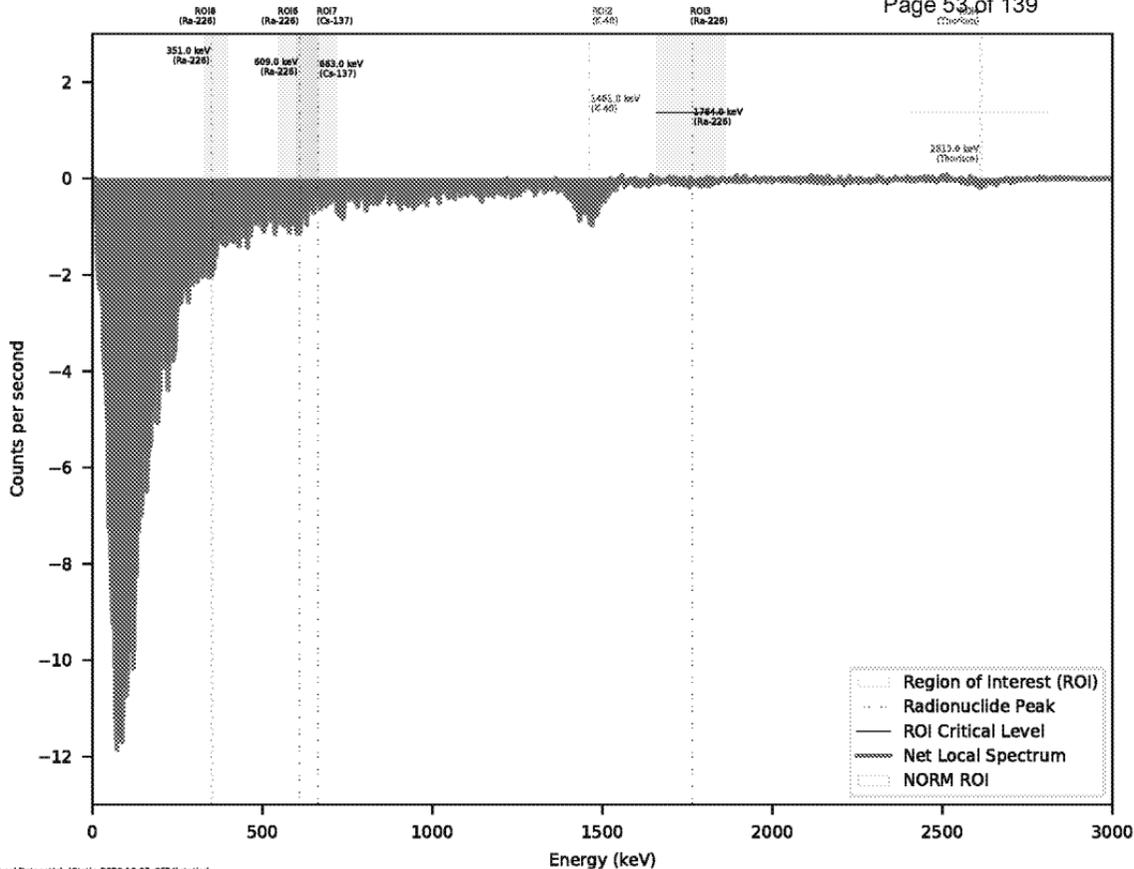


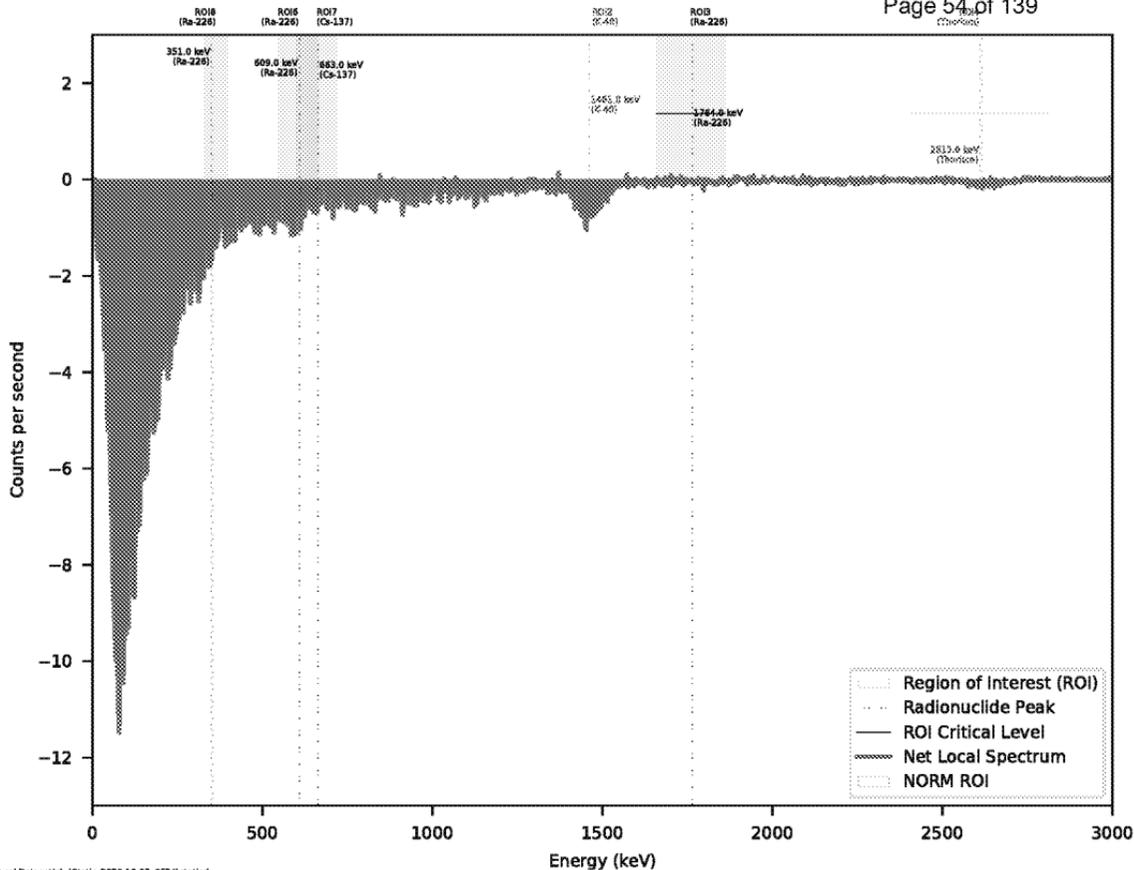


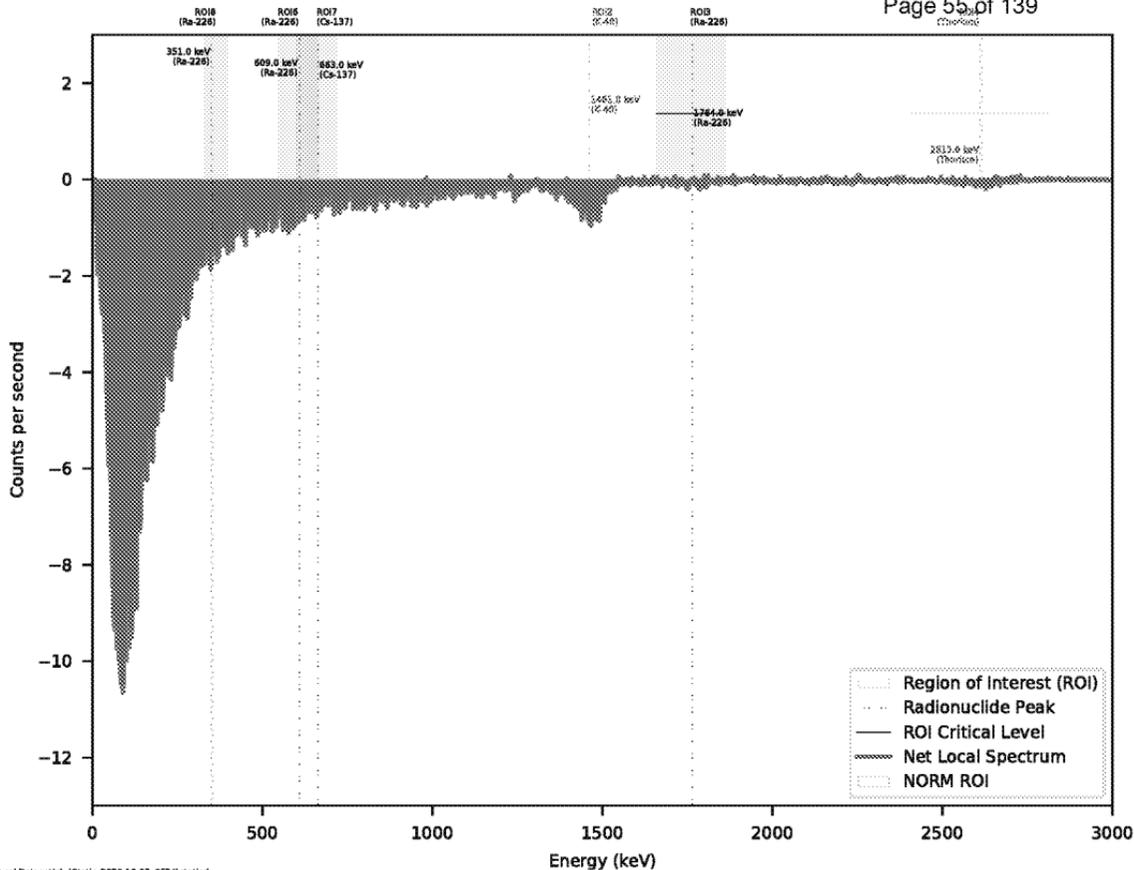














Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39827-1
Laboratory Sample Delivery Group: G146599785
Client Project/Site: HPNS-Parcel G 501197
Revision: 3

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/6/2021 1:47:11 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Job ID: 160-39827-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39827-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved, Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Added Pa234 to gamma analyte list.

Revision 2- Incorrect GFPC blue monthly background, correct background and results reported in revision.

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Job ID: 160-39827-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Revision 3- Additional information requested in case narrative for total strontium

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.9 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11) and HPPG-ESU-TU153B-021 (160-39827-21) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/12/2020, prepared on 10/20/2020 and 10/26/2020 and analyzed on 11/09/2020 and 11/11/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11), HPPG-ESU-TU153B-021 (160-39827-21) and (160-39827-A-11-A DU).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-002 (160-39827-2), HPPG-ESU-TU153B-003 (160-39827-3), HPPG-ESU-TU153B-004 (160-39827-4), HPPG-ESU-TU153B-005 (160-39827-5), HPPG-ESU-TU153B-006 (160-39827-6), HPPG-ESU-TU153B-007 (160-39827-7), HPPG-ESU-TU153B-008 (160-39827-8), HPPG-ESU-TU153B-009 (160-39827-9), HPPG-ESU-TU153B-010 (160-39827-10), HPPG-ESU-TU153B-011 (160-39827-11), HPPG-ESU-TU153B-012 (160-39827-12), HPPG-ESU-TU153B-013 (160-39827-13), HPPG-ESU-TU153B-014 (160-39827-14), HPPG-ESU-TU153B-015 (160-39827-15), HPPG-ESU-TU153B-016 (160-39827-16), HPPG-ESU-TU153B-017 (160-39827-17), HPPG-ESU-TU153B-018 (160-39827-18), HPPG-ESU-TU153B-019 (160-39827-19), HPPG-ESU-TU153B-020 (160-39827-20), HPPG-ESU-TU153B-021 (160-39827-21), HPPG-ESU-TU153B-022 (160-39827-22), HPPG-ESU-TU153B-023 (160-39827-23), HPPG-ESU-TU153B-024 (160-39827-24), HPPG-ESU-TU153B-025 (160-39827-25), HPPG-F-007 (160-39827-26) and HPPG-F-008 (160-39827-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/12/2020 and 10/13/2020, prepared on 10/18/2020 and analyzed on 11/13/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Job ID: 160-39827-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Th-227 Pb-211
Bi-214 Ra-226

The MB z-score for Pb-214 associated with Prep Batch 160-486023 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-486023/1-A)

The replicate precision for Th-234/U-238 associated with Prep Batch 160-485315 and 160-486023 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-39827-A-20-C DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murri

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

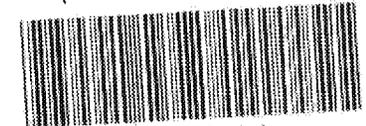
Shipment/Pickup Date: 10/8/2020

Waybill Number: 4957 0225 2175

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested



160-39827 Chain of Custody

Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)										
	Strontium-90 (EPA 905 MOD)										

Dose Rate uR/Hr	Evidence Bag ID	Comment
-----------------	-----------------	---------

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested										Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Preservatives (water)	Preservatives (soil)	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)								
HPPG-ESU-TU153B-001	10/7/2020	10:34	G	SO	1	16 oz. plastic jar	X	X	X								4	GJ46599785	
HPPG-ESU-TU153B-002	10/7/2020	10:39	G	SO	1	16 oz. plastic jar	X										4	GJ46599785	
HPPG-ESU-TU153B-003	10/7/2020	10:47	G	SO	1	16 oz. plastic jar	X										4	GJ46599785	
HPPG-ESU-TU153B-004	10/7/2020	10:55	G	SO	1	16 oz. plastic jar	X										5	GJ46599785	
HPPG-ESU-TU153B-005	10/7/2020	11:02	G	SO	1	16 oz. plastic jar	X										4	GJ46599785	
HPPG-ESU-TU153B-006	10/7/2020	11:18	G	SO	1	16 oz. plastic jar	X										4	GJ46599785	
HPPG-ESU-TU153B-007	10/7/2020	12:31	G	SO	1	16 oz. plastic jar	X										4	GJ46599785	
HPPG-ESU-TU153B-008	10/7/2020	12:34	G	SO	1	16 oz. plastic jar	X										5	GJ46599785	

Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

21 day ingrowth results only

Turanaround Time: 3-day 10-Day 28-day Other

Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/07/2020 16:09	Locked Stored (RKillpack)		10/07/2020 16:09
Locked Stored (RKillpack)		10/08/2020 10:21	Devin Lewis		10/08/2020 10:21
Devin Lewis		10/08/2020 10:32	SHIPPEDTOLAB		10/08/2020 10:32

*** Last 3 transfers shown above - Complete list of transfers on last page ***

Page 6 of 35

4/6/2021 (Rev. 3)



CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Berick
Phone #: (619)213-3389

Send Report to: Rose Cordit
Phone/Fax Number: 415-967-3760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murr

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/8/2020

Waybill Number: 4957 0225 2175

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MCD)	Strontium-90 (EPA 905 MCD)							
HPPG-ESU-TU153B-009	10/7/2020	12:39	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-010	10/7/2020	12:46	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-011	10/7/2020	12:52	G	SO	1	16 oz. plastic jar	X	X	X				4	GJ46599785		
HPPG-ESU-TU153B-012	10/7/2020	12:58	G	SO	1	16 oz. plastic jar	X						5	GJ46599785		
HPPG-ESU-TU153B-013	10/7/2020	13:05	G	SO	1	16 oz. plastic jar	X						5	GJ46599785		
HPPG-ESU-TU153B-014	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-015	10/7/2020	13:18	G	SO	1	16 oz. plastic jar	X						5	GJ46599785		
HPPG-ESU-TU153B-016	10/7/2020	13:20	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-017	10/7/2020	13:22	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-018	10/7/2020	13:29	G	SO	1	16 oz. plastic jar	X						5	GJ46599785		
HPPG-ESU-TU153B-019	10/7/2020	13:31	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-020	10/7/2020	13:33	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-021	10/7/2020	13:35	G	SO	1	16 oz. plastic jar	X	X	X				4	GJ46599785		
HPPG-ESU-TU153B-022	10/7/2020	13:38	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-023	10/7/2020	13:41	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		
HPPG-ESU-TU153B-024	10/7/2020	13:44	G	SO	1	16 oz. plastic jar	X						5	GJ46599785		
HPPG-ESU-TU153B-025	10/7/2020	13:49	G	SO	1	16 oz. plastic jar	X						4	GJ46599785		



CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Muri

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4957 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Ridler Trail North
Earth City, MO 63046

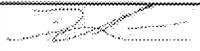
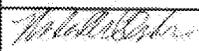
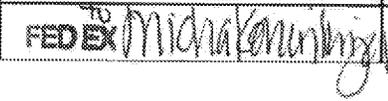
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)					
HPPG-F-007	10/7/2020	10:55	G	SO	1	16 oz. plastic jar	X					4	GJ46599785	
HPPG-F-008	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X					4	GJ46599785	



All Transfers for COC 501197RSY-007

Page 4 of 4

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/07/2020 16:09	Locked Stored (RKillpack)		10/07/2020 16:09
Locked Stored (RKillpack)		10/08/2020 10:21	Devin Lewis		10/08/2020 10:21
Devin Lewis		10/08/2020 10:32	SHIPPEDTOLAB	 FED EX TO Midnakaunbya	10/08/2020 10:55



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39827-1

SDG Number: G146599785

Login Number: 39827**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39827-1	HPPG-ESU-TU153B-001	Solid	10/07/20 10:34	10/09/20 08:55	
160-39827-2	HPPG-ESU-TU153B-002	Solid	10/07/20 10:39	10/09/20 08:55	
160-39827-3	HPPG-ESU-TU153B-003	Solid	10/07/20 10:47	10/09/20 08:55	
160-39827-4	HPPG-ESU-TU153B-004	Solid	10/07/20 10:55	10/09/20 08:55	
160-39827-5	HPPG-ESU-TU153B-005	Solid	10/07/20 11:02	10/09/20 08:55	
160-39827-6	HPPG-ESU-TU153B-006	Solid	10/07/20 11:18	10/09/20 08:55	
160-39827-7	HPPG-ESU-TU153B-007	Solid	10/07/20 12:31	10/09/20 08:55	
160-39827-8	HPPG-ESU-TU153B-008	Solid	10/07/20 12:34	10/09/20 08:55	
160-39827-9	HPPG-ESU-TU153B-009	Solid	10/07/20 12:39	10/09/20 08:55	
160-39827-10	HPPG-ESU-TU153B-010	Solid	10/07/20 12:46	10/09/20 08:55	
160-39827-11	HPPG-ESU-TU153B-011	Solid	10/07/20 12:52	10/09/20 08:55	
160-39827-12	HPPG-ESU-TU153B-012	Solid	10/07/20 12:58	10/09/20 08:55	
160-39827-13	HPPG-ESU-TU153B-013	Solid	10/07/20 13:05	10/09/20 08:55	
160-39827-14	HPPG-ESU-TU153B-014	Solid	10/07/20 13:13	10/09/20 08:55	
160-39827-15	HPPG-ESU-TU153B-015	Solid	10/07/20 13:18	10/09/20 08:55	
160-39827-16	HPPG-ESU-TU153B-016	Solid	10/07/20 13:20	10/09/20 08:55	
160-39827-17	HPPG-ESU-TU153B-017	Solid	10/07/20 13:22	10/09/20 08:55	
160-39827-18	HPPG-ESU-TU153B-018	Solid	10/07/20 13:29	10/09/20 08:55	
160-39827-19	HPPG-ESU-TU153B-019	Solid	10/07/20 13:31	10/09/20 08:55	
160-39827-20	HPPG-ESU-TU153B-020	Solid	10/07/20 13:33	10/09/20 08:55	
160-39827-21	HPPG-ESU-TU153B-021	Solid	10/07/20 13:35	10/09/20 08:55	
160-39827-22	HPPG-ESU-TU153B-022	Solid	10/07/20 13:38	10/09/20 08:55	
160-39827-23	HPPG-ESU-TU153B-023	Solid	10/07/20 13:41	10/09/20 08:55	
160-39827-24	HPPG-ESU-TU153B-024	Solid	10/07/20 13:44	10/09/20 08:55	
160-39827-25	HPPG-ESU-TU153B-025	Solid	10/07/20 13:49	10/09/20 08:55	
160-39827-26	HPPG-F-007	Solid	10/07/20 10:55	10/09/20 08:55	
160-39827-27	HPPG-F-008	Solid	10/07/20 13:13	10/09/20 08:55	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-001

Lab Sample ID: 160-39827-1

Date Collected: 10/07/20 10:34

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0282	U	0.0548	0.0548	0.160	0.0475	pCi/g	10/20/20 07:09	11/09/20 16:51	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	90.9		40 - 110					10/20/20 07:09	11/09/20 16:51	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0994	U	0.225	0.225		0.346	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Actinium 228	0.334		0.141	0.145		0.102	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-212	0.271	U	0.727	0.728		0.576	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-214	0.367		0.121	0.127		0.0511	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Cesium-137	-0.0322	U	0.0633	0.0634	0.0700	0.0495	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-210	-0.779	U	1.69	1.69		1.41	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-212	0.271		0.0735	0.0814		0.0380	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-214	0.354		0.112	0.118		0.0687	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Potassium-40	8.39		1.28	1.54		0.274	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-231	0.000	U	0.393	0.393		1.97	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-234	0.0783	U	0.250	0.250		0.203	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Radium-226	0.367		0.121	0.127	0.200	0.0511	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Radium-228	0.334		0.141	0.145		0.102	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thallium-208	0.126		0.0510	0.0527		0.0198	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-232	0.334		0.141	0.145		0.102	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-234	0.353	U	0.476	0.478		0.369	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium 228	0.271		0.0735	0.0814		0.0380	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-235	0.000	U	0.159	0.159		0.356	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-238	0.353	U	0.476	0.478		0.369	pCi/g	10/18/20 18:42	11/13/20 09:53	1

Client Sample ID: HPPG-ESU-TU153B-002

Lab Sample ID: 160-39827-2

Date Collected: 10/07/20 10:39

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0146	U	0.0268	0.0268		0.406	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Actinium 228	0.448		0.229	0.235		0.0971	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-212	-0.460	U	1.07	1.07		0.849	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Bismuth-214	0.460		0.142	0.152		0.0555	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Cesium-137	0.0145	U	0.0834	0.0834	0.0700	0.0676	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-210	-0.701	U	1.79	1.79		1.50	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-212	0.330		0.0858	0.0942		0.0425	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Lead-214	0.399		0.107	0.117		0.0586	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Potassium-40	9.82		1.53	1.90		0.278	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-231	-0.913	U	3.02	3.02		2.46	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Protactinium-234	0.111	U	0.223	0.224		0.239	pCi/g	10/18/20 18:42	11/13/20 09:53	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-002

Lab Sample ID: 160-39827-2

Date Collected: 10/07/20 10:39

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.460		0.142	0.152	0.200	0.0555	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Radium-228	0.448		0.229	0.235		0.0971	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thallium-208	0.128		0.0911	0.0923		0.0380	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-232	0.448		0.229	0.235		0.0971	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium-234	0.828		0.705	0.712		0.482	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Thorium 228	0.330		0.0858	0.0942		0.0425	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-235	0.0501	U	0.202	0.203		0.454	pCi/g	10/18/20 18:42	11/13/20 09:53	1
Uranium-238	0.828		0.705	0.712		0.482	pCi/g	10/18/20 18:42	11/13/20 09:53	1

Client Sample ID: HPPG-ESU-TU153B-003

Lab Sample ID: 160-39827-3

Date Collected: 10/07/20 10:47

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0374	U	0.114	0.114		0.429	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Actinium 228	0.750		0.230	0.245		0.0641	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Bismuth-212	-0.691	U	1.14	1.14		0.886	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Bismuth-214	0.491		0.129	0.141		0.0397	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Cesium-137	-0.00101	U	0.0620	0.0620	0.0700	0.0511	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Lead-210	2.43		2.00	2.02		1.15	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Lead-212	0.368		0.0999	0.109		0.0549	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Lead-214	0.329		0.120	0.126		0.0565	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Potassium-40	7.54		1.39	1.64		0.293	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Protactinium-231	-1.10	U	3.76	3.76		3.07	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Protactinium-234	0.138	U	0.244	0.245		0.253	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Radium-226	0.491		0.129	0.141	0.200	0.0397	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Radium-228	0.750		0.230	0.245		0.0641	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thallium-208	0.0921		0.0881	0.0887		0.0441	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thorium-232	0.750		0.230	0.245		0.0641	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thorium-234	0.0461	U	0.149	0.149		0.841	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Thorium 228	0.368		0.0999	0.109		0.0549	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Uranium-235	-0.0659	U	0.729	0.729		0.455	pCi/g	10/18/20 18:42	11/13/20 10:34	1
Uranium-238	0.0461	U	0.149	0.149		0.841	pCi/g	10/18/20 18:42	11/13/20 10:34	1

Client Sample ID: HPPG-ESU-TU153B-004

Lab Sample ID: 160-39827-4

Date Collected: 10/07/20 10:55

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.127	U	0.558	0.558		0.379	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Actinium 228	0.351		0.176	0.180		0.0799	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Bismuth-212	-0.573	U	0.971	0.973		0.760	pCi/g	10/18/20 18:42	11/13/20 10:33	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-004

Lab Sample ID: 160-39827-4

Date Collected: 10/07/20 10:55

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.427		0.144	0.151		0.0588	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Cesium-137	-0.00221	U	0.0531	0.0531	0.0700	0.0435	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Lead-210	0.344	U	1.02	1.02		0.741	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Lead-212	0.333		0.0854	0.0956		0.0454	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Lead-214	0.396		0.143	0.149		0.0932	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Potassium-40	9.79		1.42	1.74		0.291	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Protactinium-231	0.691	U	1.85	1.85		2.02	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Protactinium-234	-0.100	U	0.315	0.316		0.257	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Radium-226	0.427		0.144	0.151	0.200	0.0588	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Radium-228	0.351		0.176	0.180		0.0799	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thallium-208	0.106		0.0754	0.0762		0.0390	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thorium-232	0.351		0.176	0.180		0.0799	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thorium-234	1.12		0.598	0.611		0.407	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Thorium 228	0.333		0.0854	0.0956		0.0454	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Uranium-235	0.0672	U	0.381	0.381		0.479	pCi/g	10/18/20 18:42	11/13/20 10:33	1
Uranium-238	1.12		0.598	0.611		0.407	pCi/g	10/18/20 18:42	11/13/20 10:33	1

Client Sample ID: HPPG-ESU-TU153B-005

Lab Sample ID: 160-39827-5

Date Collected: 10/07/20 11:02

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0618	U	0.516	0.516		0.318	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Actinium 228	0.396		0.142	0.148		0.0298	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Bismuth-212	-0.306	U	0.783	0.783		0.617	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Bismuth-214	0.118	U	0.0744	0.0754		0.130	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Cesium-137	-0.0253	U	0.0610	0.0610	0.0700	0.0478	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Lead-210	-0.0409	U	1.61	1.61		1.32	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Lead-212	0.273		0.0694	0.0750		0.0303	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Lead-214	0.254		0.114	0.117		0.0876	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Potassium-40	7.69		1.31	1.52		0.226	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Protactinium-231	-0.858	U	2.85	2.85		2.32	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Protactinium-234	0.0566	U	0.104	0.104		0.238	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Radium-226	0.118	U	0.0744	0.0754	0.200	0.130	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Radium-228	0.396		0.142	0.148		0.0298	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thallium-208	0.0825		0.0568	0.0574		0.0266	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thorium-232	0.396		0.142	0.148		0.0298	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thorium-234	0.318	U	0.525	0.526		0.410	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Thorium 228	0.273		0.0694	0.0750		0.0303	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Uranium-235	-0.0350	U	0.0623	0.0624		0.417	pCi/g	10/18/20 18:42	11/13/20 10:28	1
Uranium-238	0.318	U	0.525	0.526		0.410	pCi/g	10/18/20 18:42	11/13/20 10:28	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-006

Lab Sample ID: 160-39827-6

Date Collected: 10/07/20 11:18

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.101	U	0.219	0.220		0.267	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Actinium 228	0.125		0.210	0.210		0.124	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Bismuth-212	0.0104	U	0.592	0.592		0.487	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Bismuth-214	0.381		0.116	0.122		0.0481	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Cesium-137	0.0199	U	0.0349	0.0350	0.0700	0.0262	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Lead-210	-0.678	U	1.47	1.47		1.18	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Lead-212	0.463		0.0785	0.0988		0.0334	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Lead-214	0.401		0.0797	0.0899		0.0345	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Potassium-40	7.95		1.10	1.37		0.0890	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Protactinium-231	0.574	U	1.59	1.59		1.74	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Protactinium-234	-0.0243	U	0.0457	0.0458		0.206	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Radium-226	0.381		0.116	0.122	0.200	0.0481	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Radium-228	0.125		0.210	0.210		0.124	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thallium-208	0.166		0.0433	0.0466		0.0101	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thorium-232	0.125		0.210	0.210		0.124	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thorium-234	0.192	U	0.412	0.413		0.834	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Thorium 228	0.463		0.0785	0.0988		0.0334	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Uranium-235	0.0550	U	0.183	0.183		0.369	pCi/g	10/18/20 18:42	11/13/20 10:30	1
Uranium-238	0.192	U	0.412	0.413		0.834	pCi/g	10/18/20 18:42	11/13/20 10:30	1

Client Sample ID: HPPG-ESU-TU153B-007

Lab Sample ID: 160-39827-7

Date Collected: 10/07/20 12:31

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.225	U	0.459	0.460		0.272	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Actinium 228	0.264		0.264	0.265		0.151	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Bismuth-212	0.0912	U	0.977	0.977		0.797	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Bismuth-214	0.382		0.128	0.133		0.0451	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Cesium-137	0.0274	U	0.0627	0.0628	0.0700	0.0483	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Lead-210	1.04		1.61	1.62		1.04	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Lead-212	0.386		0.0899	0.0985		0.0423	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Lead-214	0.483		0.109	0.119		0.0406	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Potassium-40	8.66		1.60	1.82		0.250	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Protactinium-231	0.000	U	0.662	0.662		2.39	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Protactinium-234	0.194	U	0.235	0.236		0.214	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Radium-226	0.382		0.128	0.133	0.200	0.0451	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Radium-228	0.264		0.264	0.265		0.151	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thallium-208	0.122		0.0895	0.0904		0.0449	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thorium-232	0.264		0.264	0.265		0.151	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thorium-234	0.830		0.581	0.588		0.424	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Thorium 228	0.386		0.0899	0.0985		0.0423	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Uranium-235	0.0584	U	0.129	0.129		0.467	pCi/g	10/18/20 18:42	11/13/20 10:22	1
Uranium-238	0.830		0.581	0.588		0.424	pCi/g	10/18/20 18:42	11/13/20 10:22	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-008

Lab Sample ID: 160-39827-8

Date Collected: 10/07/20 12:34

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.131	U	0.275	0.275		0.209	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Actinium 228	0.583		0.166	0.177		0.0269	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Bismuth-212	0.222	U	0.629	0.629		0.496	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Bismuth-214	0.389		0.128	0.134		0.0483	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Cesium-137	0.0267	U	0.0459	0.0460	0.0700	0.0347	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Lead-210	0.0332	U	1.48	1.48		1.20	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Lead-212	0.296		0.0822	0.0907		0.0465	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Lead-214	0.435		0.105	0.115		0.0444	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Potassium-40	7.61		1.33	1.55		0.378	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Protactinium-231	-0.708	U	2.61	2.62		2.13	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Protactinium-234	0.0148	U	0.0247	0.0247		0.167	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Radium-226	0.389		0.128	0.134	0.200	0.0483	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Radium-228	0.583		0.166	0.177		0.0269	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thallium-208	0.111		0.0910	0.0918		0.0403	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thorium-232	0.583		0.166	0.177		0.0269	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thorium-234	-0.244	U	0.940	0.941		0.780	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Thorium 228	0.296		0.0822	0.0907		0.0465	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Uranium-235	-0.0245	U	0.176	0.176		0.248	pCi/g	10/18/20 18:42	11/13/20 10:24	1
Uranium-238	-0.244	U	0.940	0.941		0.780	pCi/g	10/18/20 18:42	11/13/20 10:24	1

Client Sample ID: HPPG-ESU-TU153B-009

Lab Sample ID: 160-39827-9

Date Collected: 10/07/20 12:39

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0448	U	0.636	0.636		0.356	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Actinium 228	0.678		0.184	0.197		0.0819	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Bismuth-212	0.265	U	0.438	0.439		0.311	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Bismuth-214	0.378		0.132	0.138		0.0500	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Cesium-137	0.0422	U	0.0759	0.0760	0.0700	0.0589	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Lead-210	-1.04	U	0.900	0.908		1.39	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Lead-212	0.332		0.0972	0.106		0.0576	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Lead-214	0.296		0.145	0.148		0.100	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Potassium-40	7.85		1.38	1.60		0.142	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Protactinium-231	0.00000011	U	2.96	2.96		2.44	pCi/g	10/18/20 18:42	11/13/20 10:31	1
	6									
Protactinium-234	0.0968	U	0.253	0.253		0.205	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Radium-226	0.378		0.132	0.138	0.200	0.0500	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Radium-228	0.678		0.184	0.197		0.0819	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thallium-208	0.154		0.0747	0.0764		0.0288	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thorium-232	0.678		0.184	0.197		0.0819	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thorium-234	-0.876	U	0.775	0.781		0.911	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Thorium 228	0.332		0.0972	0.106		0.0576	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Uranium-235	-0.0202	U	0.563	0.563		0.386	pCi/g	10/18/20 18:42	11/13/20 10:31	1
Uranium-238	-0.876	U	0.775	0.781		0.911	pCi/g	10/18/20 18:42	11/13/20 10:31	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-010

Lab Sample ID: 160-39827-10

Date Collected: 10/07/20 12:46

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.183	U	0.376	0.376		0.221	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Actinium 228	0.442		0.134	0.141		0.0354	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Bismuth-212	0.0501	U	0.776	0.776		0.634	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Bismuth-214	0.367		0.113	0.119		0.0381	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Cesium-137	-0.0243	U	0.0678	0.0679	0.0700	0.0503	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Lead-210	0.666	U	1.32	1.33		0.881	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Lead-212	0.340		0.0714	0.0797		0.0245	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Lead-214	0.304		0.0887	0.0939		0.0385	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Potassium-40	8.24		1.46	1.68		0.220	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Protactinium-231	0.178	U	1.29	1.29		2.00	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Protactinium-234	0.140	U	0.190	0.191		0.150	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Radium-226	0.367		0.113	0.119	0.200	0.0381	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Radium-228	0.442		0.134	0.141		0.0354	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thallium-208	0.138		0.0519	0.0537		0.0168	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thorium-232	0.442		0.134	0.141		0.0354	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thorium-234	0.359	U	0.558	0.559		0.365	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Thorium 228	0.340		0.0714	0.0797		0.0245	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Uranium-235	0.116	U	0.233	0.234		0.305	pCi/g	10/18/20 18:42	11/13/20 11:48	1
Uranium-238	0.359	U	0.558	0.559		0.365	pCi/g	10/18/20 18:42	11/13/20 11:48	1

Client Sample ID: HPPG-ESU-TU153B-011

Lab Sample ID: 160-39827-11

Date Collected: 10/07/20 12:52

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.00903	U	0.0601	0.0601	0.160	0.0501	pCi/g	10/26/20 07:37	11/11/20 18:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	96.2		40 - 110					10/26/20 07:37	11/11/20 18:44	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.195	U	0.615	0.616		0.376	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Actinium 228	0.439		0.184	0.189		0.0862	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Bismuth-212	0.0245	U	0.656	0.656		0.538	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Bismuth-214	0.380		0.121	0.128		0.0510	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Cesium-137	-0.0371	U	0.0605	0.0606	0.0700	0.0467	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Lead-210	0.731	U	1.38	1.38		0.881	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Lead-212	0.410		0.0877	0.102		0.0441	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Lead-214	0.467		0.105	0.116		0.0392	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Potassium-40	9.92		1.37	1.71		0.271	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Protactinium-231	0.610	U	2.30	2.30		1.87	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Protactinium-234	-0.0356	U	0.209	0.209		0.171	pCi/g	10/18/20 18:42	11/13/20 11:50	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-011

Lab Sample ID: 160-39827-11

Date Collected: 10/07/20 12:52

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.380		0.121	0.128	0.200	0.0510	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Radium-228	0.439		0.184	0.189		0.0862	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thallium-208	0.163		0.0515	0.0542		0.0202	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thorium-232	0.439		0.184	0.189		0.0862	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thorium-234	0.152	U	0.468	0.469		0.375	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Thorium 228	0.410		0.0877	0.102		0.0441	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Uranium-235	0.0843	U	0.221	0.221		0.286	pCi/g	10/18/20 18:42	11/13/20 11:50	1
Uranium-238	0.152	U	0.468	0.469		0.375	pCi/g	10/18/20 18:42	11/13/20 11:50	1

Client Sample ID: HPPG-ESU-TU153B-012

Lab Sample ID: 160-39827-12

Date Collected: 10/07/20 12:58

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0263	U	0.304	0.304		0.250	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Actinium 228	0.469		0.192	0.198		0.0789	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Bismuth-212	-0.337	U	0.665	0.665		0.521	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Bismuth-214	0.367		0.0971	0.104		0.0448	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Cesium-137	-0.0521	U	0.0840	0.0842	0.0700	0.0666	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Lead-210	1.61		1.07	1.09		0.546	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Lead-212	0.363		0.0729	0.0867		0.0351	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Lead-214	0.355		0.0959	0.103		0.0409	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Potassium-40	7.16		1.07	1.30		0.243	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Protactinium-231	-0.790	U	2.49	2.49		2.03	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Protactinium-234	-0.0785	U	0.225	0.225		0.183	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Radium-226	0.367		0.0971	0.104	0.200	0.0448	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Radium-228	0.469		0.192	0.198		0.0789	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thallium-208	0.130		0.0386	0.0409		0.0115	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thorium-232	0.469		0.192	0.198		0.0789	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thorium-234	0.325	U	0.701	0.702		0.718	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Thorium 228	0.363		0.0729	0.0867		0.0351	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Uranium-235	0.000	U	0.0624	0.0625		0.321	pCi/g	10/18/20 18:42	11/13/20 11:46	1
Uranium-238	0.325	U	0.701	0.702		0.718	pCi/g	10/18/20 18:42	11/13/20 11:46	1

Client Sample ID: HPPG-ESU-TU153B-013

Lab Sample ID: 160-39827-13

Date Collected: 10/07/20 13:05

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.247	U	0.727	0.728		0.444	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Actinium 228	0.684		0.190	0.202		0.0307	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Bismuth-212	0.278	U	0.778	0.779		0.615	pCi/g	10/18/20 18:42	11/13/20 11:47	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-013

Lab Sample ID: 160-39827-13

Date Collected: 10/07/20 13:05

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.489		0.135	0.144		0.0538	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Cesium-137	0.00719	U	0.0482	0.0482	0.0700	0.0388	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Lead-210	-0.849	U	1.95	1.95		1.64	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Lead-212	0.397		0.101	0.109		0.0424	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Lead-214	0.571		0.128	0.140		0.0404	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Potassium-40	9.03		1.36	1.64		0.119	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Protactinium-231	0.221	U	1.47	1.47		2.27	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Protactinium-234	-0.105	U	0.315	0.315		0.257	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Radium-226	0.489		0.135	0.144	0.200	0.0538	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Radium-228	0.684		0.190	0.202		0.0307	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thallium-208	0.150		0.0878	0.0891		0.0388	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thorium-232	0.684		0.190	0.202		0.0307	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thorium-234	-0.945	U	0.651	0.659		0.938	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Thorium 228	0.397		0.101	0.109		0.0424	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Uranium-235	0.000	U	0.237	0.237		0.445	pCi/g	10/18/20 18:42	11/13/20 11:47	1
Uranium-238	-0.945	U	0.651	0.659		0.938	pCi/g	10/18/20 18:42	11/13/20 11:47	1

Client Sample ID: HPPG-ESU-TU153B-014

Lab Sample ID: 160-39827-14

Date Collected: 10/07/20 13:13

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0514	U	0.157	0.157		0.260	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Actinium 228	0.243		0.0873	0.0908		0.0198	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Bismuth-212	0.0137	U	0.496	0.496		0.407	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Bismuth-214	0.329		0.0822	0.0890		0.0311	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Cesium-137	0.0143	U	0.0461	0.0461	0.0700	0.0368	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Lead-210	0.191	U	1.15	1.15		0.939	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Lead-212	0.316		0.0812	0.0909		0.0356	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Lead-214	0.344		0.0948	0.101		0.0390	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Potassium-40	8.78		1.09	1.41		0.0781	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Protactinium-231	0.000	U	0.569	0.569		1.49	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Protactinium-234	0.0936		0.112	0.113		0.0541	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Radium-226	0.329		0.0822	0.0890	0.200	0.0311	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Radium-228	0.243		0.0873	0.0908		0.0198	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thallium-208	0.137		0.0386	0.0412		0.0101	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thorium-232	0.243		0.0873	0.0908		0.0198	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thorium-234	-0.300	U	0.979	0.980		0.800	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Thorium 228	0.316		0.0812	0.0909		0.0356	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Uranium-235	0.000	U	0.149	0.149		0.305	pCi/g	10/18/20 18:42	11/13/20 11:52	1
Uranium-238	-0.300	U	0.979	0.980		0.800	pCi/g	10/18/20 18:42	11/13/20 11:52	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-015

Lab Sample ID: 160-39827-15

Date Collected: 10/07/20 13:18

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0270	U	0.425	0.425		0.289	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Actinium 228	0.165		0.0798	0.0816		0.133	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Bismuth-212	-0.250	U	0.622	0.623		0.489	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Bismuth-214	0.207		0.0778	0.0807		0.0344	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Cesium-137	-0.0243	U	0.0574	0.0574	0.0700	0.0452	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Lead-210	0.656	U	1.27	1.27		0.803	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Lead-212	0.189		0.0648	0.0693		0.0377	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Lead-214	0.387		0.102	0.110		0.0506	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Potassium-40	6.20		1.07	1.24		0.253	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Protactinium-231	-0.410	U	2.27	2.27		1.86	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Protactinium-234	0.0786	U	0.250	0.251		0.204	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Radium-226	0.207		0.0778	0.0807	0.200	0.0344	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Radium-228	0.165		0.0798	0.0816		0.133	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thallium-208	0.137		0.0563	0.0581		0.0221	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thorium-232	0.165		0.0798	0.0816		0.133	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thorium-234	0.158	U	0.448	0.448		0.358	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Thorium 228	0.189		0.0648	0.0693		0.0377	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Uranium-235	0.000	U	0.105	0.105		0.358	pCi/g	10/18/20 18:42	11/13/20 11:54	1
Uranium-238	0.158	U	0.448	0.448		0.358	pCi/g	10/18/20 18:42	11/13/20 11:54	1

Client Sample ID: HPPG-ESU-TU153B-016

Lab Sample ID: 160-39827-16

Date Collected: 10/07/20 13:20

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.438	U	0.833	0.835		0.503	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Actinium 228	0.158	U	0.261	0.262		0.182	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Bismuth-212	0.354	U	0.636	0.638		0.478	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Bismuth-214	0.467		0.177	0.185		0.0719	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Cesium-137	0.000177	U	0.0757	0.0757	0.0700	0.0623	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Lead-210	1.81		1.74	1.76		1.07	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Lead-212	0.429		0.100	0.112		0.0517	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Lead-214	0.593		0.122	0.140		0.0564	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Potassium-40	9.94		1.55	1.93		0.281	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Protactinium-231	0.615	U	2.10	2.10		2.29	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Protactinium-234	0.109	U	0.330	0.331		0.269	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Radium-226	0.467		0.177	0.185	0.200	0.0719	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Radium-228	0.158	U	0.261	0.262		0.182	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thallium-208	0.224		0.0745	0.0788		0.0297	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thorium-232	0.158	U	0.261	0.262		0.182	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thorium-234	0.997		0.595	0.608		0.416	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Thorium 228	0.429		0.100	0.112		0.0517	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Uranium-235	-0.234	U	0.338	0.339		0.542	pCi/g	10/18/20 18:42	11/13/20 11:55	1
Uranium-238	0.997		0.595	0.608		0.416	pCi/g	10/18/20 18:42	11/13/20 11:55	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-017

Lab Sample ID: 160-39827-17

Date Collected: 10/07/20 13:22

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.276	U	0.554	0.555		0.389	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Actinium 228	0.477		0.259	0.263		0.107	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Bismuth-212	-0.302	U	0.996	0.997		0.797	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Bismuth-214	0.393		0.118	0.125		0.0394	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Cesium-137	-0.000665	U	0.0733	0.0733	0.0700	0.0604	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Lead-210	1.73		1.63	1.64		0.994	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Lead-212	0.419		0.0840	0.0947		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Lead-214	0.392		0.111	0.118		0.0550	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Potassium-40	9.66		1.57	1.85		0.218	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Protactinium-231	0.000	U	0.620	0.620		2.16	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Protactinium-234	0.0275	U	0.0548	0.0549		0.227	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Radium-226	0.393		0.118	0.125	0.200	0.0394	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Radium-228	0.477		0.259	0.263		0.107	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thallium-208	0.157		0.0517	0.0541		0.0148	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thorium-232	0.477		0.259	0.263		0.107	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thorium-234	0.460		0.532	0.534		0.412	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Thorium 228	0.419		0.0840	0.0947		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Uranium-235	0.131	U	0.383	0.383		0.388	pCi/g	10/18/20 18:42	11/13/20 14:38	1
Uranium-238	0.460		0.532	0.534		0.412	pCi/g	10/18/20 18:42	11/13/20 14:38	1

Client Sample ID: HPPG-ESU-TU153B-018

Lab Sample ID: 160-39827-18

Date Collected: 10/07/20 13:29

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.222	U	0.462	0.462		0.275	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Actinium 228	0.232		0.189	0.190		0.114	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Bismuth-212	-0.268	U	0.902	0.902		0.723	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Bismuth-214	0.326		0.108	0.113		0.0448	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Cesium-137	-0.0163	U	0.0581	0.0582	0.0700	0.0463	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Lead-210	1.31		1.38	1.39		0.881	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Lead-212	0.455		0.0894	0.107		0.0382	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Lead-214	0.401		0.103	0.111		0.0486	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Potassium-40	7.57		1.27	1.48		0.296	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Protactinium-231	0.598	U	1.83	1.83		2.00	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Protactinium-234	-0.101	U	0.248	0.248		0.201	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Radium-226	0.326		0.108	0.113	0.200	0.0448	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Radium-228	0.232		0.189	0.190		0.114	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thallium-208	0.172		0.0711	0.0734		0.0302	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thorium-232	0.232		0.189	0.190		0.114	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thorium-234	-0.749	U	0.570	0.576		0.805	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Thorium 228	0.455		0.0894	0.107		0.0382	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Uranium-235	-0.0172	U	0.429	0.429		0.290	pCi/g	10/18/20 18:42	11/13/20 14:40	1
Uranium-238	-0.749	U	0.570	0.576		0.805	pCi/g	10/18/20 18:42	11/13/20 14:40	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-019

Lab Sample ID: 160-39827-19

Date Collected: 10/07/20 13:31

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0690	U	0.249	0.249		0.306	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Actinium 228	0.292		0.183	0.185		0.0953	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Bismuth-212	-0.239	U	0.743	0.743		0.595	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Bismuth-214	0.369		0.113	0.119		0.0481	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Cesium-137	-0.0157	U	0.0602	0.0602	0.0700	0.0485	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Lead-210	-0.380	U	1.19	1.19		0.963	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Lead-212	0.408		0.0768	0.0932		0.0356	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Lead-214	0.432		0.101	0.111		0.0434	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Potassium-40	9.15		1.22	1.54		0.249	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Protactinium-231	-0.812	U	2.52	2.52		2.05	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Protactinium-234	0.0207	U	0.0434	0.0434		0.195	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Radium-226	0.369		0.113	0.119	0.200	0.0481	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Radium-228	0.292		0.183	0.185		0.0953	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thallium-208	0.176		0.0463	0.0498		0.0128	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thorium-232	0.292		0.183	0.185		0.0953	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thorium-234	0.350	U	0.585	0.586		0.520	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Thorium 228	0.408		0.0768	0.0932		0.0356	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Uranium-235	0.0232	U	0.0365	0.0366		0.372	pCi/g	10/18/20 18:42	11/13/20 14:42	1
Uranium-238	0.350	U	0.585	0.586		0.520	pCi/g	10/18/20 18:42	11/13/20 14:42	1

Client Sample ID: HPPG-ESU-TU153B-020

Lab Sample ID: 160-39827-20

Date Collected: 10/07/20 13:33

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0437	U	0.0725	0.0726		0.355	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Actinium 228	0.165		0.222	0.223		0.133	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Bismuth-212	-0.319	U	0.967	0.968		0.774	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Bismuth-214	0.278		0.111	0.115		0.0519	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Cesium-137	0.0276	U	0.0516	0.0516	0.0700	0.0393	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Lead-210	-0.931	U	1.82	1.82		1.53	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Lead-212	0.376		0.0817	0.0906		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Lead-214	0.396		0.120	0.126		0.0543	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Potassium-40	8.41		1.29	1.54		0.115	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Protactinium-231	0.000	U	0.160	0.160		2.13	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Protactinium-234	0.0627	U	0.190	0.191		0.211	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Radium-226	0.278		0.111	0.115	0.200	0.0519	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Radium-228	0.165		0.222	0.223		0.133	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thallium-208	0.139		0.0627	0.0643		0.0266	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thorium-232	0.165		0.222	0.223		0.133	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thorium-234	-0.551	U	0.734	0.736		0.791	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Thorium 228	0.376		0.0817	0.0906		0.0360	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Uranium-235	0.125	U	0.251	0.252		0.196	pCi/g	10/18/20 18:42	11/13/20 14:43	1
Uranium-238	-0.551	U	0.734	0.736		0.791	pCi/g	10/18/20 18:42	11/13/20 14:43	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-021

Lab Sample ID: 160-39827-21

Date Collected: 10/07/20 13:35

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.00521	U	0.0586	0.0586	0.160	0.0486	pCi/g	10/26/20 07:37	11/11/20 18:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	92.1		40 - 110					10/26/20 07:37	11/11/20 18:44	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.139	U	0.303	0.303		0.263	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Actinium 228	0.493		0.139	0.148		0.0357	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Bismuth-212	0.000	U	0.426	0.426		0.420	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Bismuth-214	0.337		0.0908	0.0973		0.0356	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Cesium-137	0.00235	U	0.0481	0.0482	0.0700	0.0395	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Lead-210	-0.629	U	1.39	1.39		1.12	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Lead-212	0.478		0.0737	0.0962		0.0276	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Lead-214	0.451		0.0898	0.101		0.0451	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Potassium-40	8.47		1.12	1.42		0.228	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Protactinium-231	0.000	U	0.549	0.549		1.63	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Protactinium-234	-0.0247	U	0.0427	0.0428		0.202	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Radium-226	0.337		0.0908	0.0973	0.200	0.0356	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Radium-228	0.493		0.139	0.148		0.0357	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thallium-208	0.143		0.0470	0.0493		0.0179	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thorium-232	0.493		0.139	0.148		0.0357	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thorium-234	0.117	U	0.386	0.387		0.803	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Thorium 228	0.478		0.0737	0.0962		0.0276	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Uranium-235	0.138	U	0.409	0.409		0.333	pCi/g	10/18/20 19:20	11/13/20 18:29	1
Uranium-238	0.117	U	0.386	0.387		0.803	pCi/g	10/18/20 19:20	11/13/20 18:29	1

Client Sample ID: HPPG-ESU-TU153B-022

Lab Sample ID: 160-39827-22

Date Collected: 10/07/20 13:38

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.148	U	0.538	0.538		0.327	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Actinium 228	0.541		0.154	0.163		0.0685	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Bismuth-212	-0.0429	U	0.733	0.733		0.600	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Bismuth-214	0.118	U	0.117	0.117		0.193	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Cesium-137	-0.0450	U	0.0747	0.0748	0.0700	0.0579	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Lead-210	0.616	U	1.65	1.65		1.32	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Lead-212	0.321		0.0838	0.0902		0.0439	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Lead-214	0.372		0.112	0.119		0.0467	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Potassium-40	6.34		1.29	1.44		0.291	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Protactinium-231	-0.181	U	2.69	2.69		2.21	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Protactinium-234	0.0354	U	0.0712	0.0713		0.256	pCi/g	10/18/20 19:20	11/13/20 18:30	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-022

Lab Sample ID: 160-39827-22

Date Collected: 10/07/20 13:38

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.118	U	0.117	0.117	0.200	0.193	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Radium-228	0.541		0.154	0.163		0.0685	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thallium-208	0.153		0.0450	0.0476		0.00760	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thorium-232	0.541		0.154	0.163		0.0685	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thorium-234	0.460	U	0.653	0.655		0.470	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Thorium 228	0.321		0.0838	0.0902		0.0439	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Uranium-235	0.200	U	0.386	0.387		0.396	pCi/g	10/18/20 19:20	11/13/20 18:30	1
Uranium-238	0.460	U	0.653	0.655		0.470	pCi/g	10/18/20 19:20	11/13/20 18:30	1

Client Sample ID: HPPG-ESU-TU153B-023

Lab Sample ID: 160-39827-23

Date Collected: 10/07/20 13:41

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.00781	U	0.0396	0.0396		0.273	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Actinium 228	0.407		0.119	0.126		0.0202	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Bismuth-212	1.40		0.396	0.422		0.0653	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Bismuth-214	0.458		0.109	0.119		0.0376	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Cesium-137	-0.0103	U	0.0578	0.0578	0.0700	0.0469	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Lead-210	-0.389	U	1.23	1.23		1.00	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Lead-212	0.439		0.0721	0.0918		0.0303	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Lead-214	0.488		0.107	0.119		0.0429	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Potassium-40	8.35		1.07	1.37		0.0797	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Protactinium-231	0.535	U	1.67	1.67		1.36	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Protactinium-234	0.0592	U	0.0798	0.0800		0.203	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Radium-226	0.458		0.109	0.119	0.200	0.0376	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Radium-228	0.407		0.119	0.126		0.0202	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thallium-208	0.150		0.0391	0.0421		0.00902	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thorium-232	0.407		0.119	0.126		0.0202	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thorium-234	0.527		0.324	0.329		0.277	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Thorium 228	0.439		0.0721	0.0918		0.0303	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Uranium-235	0.0956	U	0.173	0.173		0.359	pCi/g	10/18/20 19:20	11/13/20 18:32	1
Uranium-238	0.527		0.324	0.329		0.277	pCi/g	10/18/20 19:20	11/13/20 18:32	1

Client Sample ID: HPPG-ESU-TU153B-024

Lab Sample ID: 160-39827-24

Date Collected: 10/07/20 13:44

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.321	U	0.573	0.575		0.370	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Actinium 228	0.412		0.153	0.159		0.132	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Bismuth-212	0.000	U	0.590	0.590		0.595	pCi/g	10/18/20 19:20	11/13/20 18:34	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-024

Lab Sample ID: 160-39827-24

Date Collected: 10/07/20 13:44

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.348		0.122	0.128		0.0536	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Cesium-137	-0.0150	U	0.0549	0.0549	0.0700	0.0438	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Lead-210	0.990		1.20	1.21		0.783	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Lead-212	0.399		0.0878	0.102		0.0442	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Lead-214	0.486		0.114	0.125		0.0606	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Potassium-40	8.96		1.33	1.61		0.276	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Protactinium-231	0.463	U	1.71	1.72		1.91	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Protactinium-234	-0.0906	U	0.289	0.289		0.235	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Radium-226	0.348		0.122	0.128	0.200	0.0536	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Radium-228	0.412		0.153	0.159		0.132	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thallium-208	0.132		0.0490	0.0509		0.0196	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thorium-232	0.412		0.153	0.159		0.132	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thorium-234	0.0963	U	0.544	0.544		0.441	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Thorium 228	0.399		0.0878	0.102		0.0442	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Uranium-235	0.135	U	0.425	0.426		0.346	pCi/g	10/18/20 19:20	11/13/20 18:34	1
Uranium-238	0.0963	U	0.544	0.544		0.441	pCi/g	10/18/20 19:20	11/13/20 18:34	1

Client Sample ID: HPPG-ESU-TU153B-025

Lab Sample ID: 160-39827-25

Date Collected: 10/07/20 13:49

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.137	U	0.386	0.386		0.363	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Actinium 228	0.621		0.214	0.223		0.0823	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Bismuth-212	0.364	U	0.844	0.845		0.658	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Bismuth-214	0.494		0.141	0.150		0.0455	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Cesium-137	0.00915	U	0.0791	0.0791	0.0700	0.0643	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Lead-210	1.86		1.70	1.72		1.04	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Lead-212	0.488		0.101	0.113		0.0506	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Lead-214	0.587		0.122	0.136		0.0451	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Potassium-40	8.80		1.57	1.80		0.236	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Protactinium-231	0.255	U	1.47	1.47		2.27	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Protactinium-234	0.162	U	0.100	0.101		0.237	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Radium-226	0.494		0.141	0.150	0.200	0.0455	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Radium-228	0.621		0.214	0.223		0.0823	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thallium-208	0.188		0.0650	0.0678		0.0237	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thorium-232	0.621		0.214	0.223		0.0823	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thorium-234	0.0743	U	0.126	0.126		0.579	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Thorium 228	0.488		0.101	0.113		0.0506	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Uranium-235	-0.218	U	0.418	0.418		0.457	pCi/g	10/18/20 19:20	11/13/20 19:28	1
Uranium-238	0.0743	U	0.126	0.126		0.579	pCi/g	10/18/20 19:20	11/13/20 19:28	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Client Sample ID: HPPG-F-007

Lab Sample ID: 160-39827-26

Date Collected: 10/07/20 10:55

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.220	U	0.603	0.603		0.367	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Actinium 228	0.481		0.149	0.157		0.0265	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Bismuth-212	-0.382	U	0.816	0.817		0.643	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Bismuth-214	0.344		0.114	0.120		0.0447	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Cesium-137	0.00304	U	0.0612	0.0612	0.0700	0.0502	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Lead-210	0.538	U	1.29	1.29		0.859	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Lead-212	0.489		0.0923	0.112		0.0434	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Lead-214	0.399		0.118	0.125		0.0508	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Potassium-40	8.64		1.28	1.56		0.271	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Protactinium-231	0.000	U	0.617	0.617		2.19	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Protactinium-234	-0.0226	U	0.0421	0.0422		0.184	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Radium-226	0.344		0.114	0.120	0.200	0.0447	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Radium-228	0.481		0.149	0.157		0.0265	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thallium-208	0.123		0.0792	0.0802		0.0372	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thorium-232	0.481		0.149	0.157		0.0265	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thorium-234	0.164	U	0.450	0.450		0.359	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Thorium 228	0.489		0.0923	0.112		0.0434	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Uranium-235	0.180	U	0.264	0.265		0.239	pCi/g	10/18/20 19:20	11/13/20 19:31	1
Uranium-238	0.164	U	0.450	0.450		0.359	pCi/g	10/18/20 19:20	11/13/20 19:31	1

Client Sample ID: HPPG-F-008

Lab Sample ID: 160-39827-27

Date Collected: 10/07/20 13:13

Matrix: Solid

Date Received: 10/09/20 08:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.145	U	0.376	0.376		0.272	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Actinium 228	0.261		0.128	0.130		0.0903	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Bismuth-212	0.241	U	0.534	0.534		0.417	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Bismuth-214	0.401		0.0897	0.0989		0.0309	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Cesium-137	0.0170	U	0.0374	0.0374	0.0700	0.0289	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Lead-210	-0.171	U	1.32	1.32		1.08	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Lead-212	0.323		0.0686	0.0803		0.0337	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Lead-214	0.339		0.0921	0.0986		0.0384	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Potassium-40	9.10		1.18	1.51		0.236	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Protactinium-231	-0.770	U	2.38	2.38		1.94	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Protactinium-234	-0.0131	U	0.0256	0.0256		0.194	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Radium-226	0.401		0.0897	0.0989	0.200	0.0309	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Radium-228	0.261		0.128	0.130		0.0903	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thallium-208	0.125		0.0391	0.0412		0.0118	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thorium-232	0.261		0.128	0.130		0.0903	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thorium-234	0.171	U	0.390	0.390		0.794	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Thorium 228	0.323		0.0686	0.0803		0.0337	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Uranium-235	0.000	U	0.148	0.148		0.347	pCi/g	10/18/20 19:20	11/13/20 19:27	1
Uranium-238	0.171	U	0.390	0.390		0.794	pCi/g	10/18/20 19:20	11/13/20 19:27	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-486247/24-A
Matrix: Solid
Analysis Batch: 488625

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486247

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.05901		0.0645	0.0646	0.160	0.0486	pCi/g	10/20/20 07:09	11/09/20 16:51	1
Carrier	MB MB		Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110					10/20/20 07:09	11/09/20 16:51	1

Lab Sample ID: LCS 160-486247/1-A
Matrix: Solid
Analysis Batch: 488624

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486247

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.78	6.438		0.528	0.160	0.0457	pCi/g	83	75 - 125
Carrier	LCS LCS		Limits						
Sr Carrier	%Yield	Qualifier	40 - 110						
	96.5								

Lab Sample ID: MB 160-486707/15-A
Matrix: Solid
Analysis Batch: 488917

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486707

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.007957	U	0.0569	0.0569	0.160	0.0461	pCi/g	10/26/20 07:37	11/11/20 18:45	1
Carrier	MB MB		Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110					10/26/20 07:37	11/11/20 18:45	1
	96.1									

Lab Sample ID: LCS 160-486707/1-A
Matrix: Solid
Analysis Batch: 488917

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486707

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.78	6.595		0.543	0.160	0.0537	pCi/g	85	75 - 125
Carrier	LCS LCS		Limits						
Sr Carrier	%Yield	Qualifier	40 - 110						
	91.7								

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: 905.0 - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: 160-39827-11 DU
 Matrix: Solid
 Analysis Batch: 488917

Client Sample ID: HPPG-ESU-TU153B-011
 Prep Type: Total/NA
 Prep Batch: 486707

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)						
Total Beta Strontium	-0.00903	U	-0.03089	U	0.0607	0.160	0.0523	pCi/g		0.18	1
DU DU											
Carrier	%Yield	Qualifier	Limits								
Sr Carrier	93.8		40 - 110								

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-486023/1-A
 Matrix: Solid
 Analysis Batch: 489008

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 486023

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.1769	U	0.424	0.425		0.242	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Actinium 228	0.02101	U	0.129	0.129		0.0625	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Bismuth-212	0.0000	U	0.190	0.190		0.239	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Bismuth-214	-0.06374	U	0.0881	0.0884		0.123	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Cesium-137	0.02344	U	0.0455	0.0456	0.0700	0.0347	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Lead-210	-0.4488	U	0.864	0.865		0.672	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Lead-212	-0.02759	U	0.0633	0.0634		0.0499	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Lead-214	-0.1044	U	0.0540	0.0550		0.0874	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Potassium-40	0.04732	U	0.568	0.568		0.270	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Protactinium-231	0.0000	U	0.503	0.503		1.33	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Protactinium-234	-0.06646	U	0.188	0.188		0.152	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Radium-226	-0.06374	U	0.0881	0.0884	0.200	0.123	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Radium-228	0.02101	U	0.129	0.129		0.0625	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Thallium-208	-0.01173	U	0.0480	0.0480		0.0256	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Thorium-232	0.02101	U	0.129	0.129		0.0625	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Thorium-234	0.0000	U	0.0848	0.0848		0.625	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Thorium 228	-0.02759	U	0.0633	0.0634		0.0499	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Uranium-235	0.03052	U	0.0895	0.0896		0.268	pCi/g	10/18/20 18:42	11/13/20 09:50	1
Uranium-238	0.0000	U	0.0848	0.0848		0.625	pCi/g	10/18/20 18:42	11/13/20 09:50	1

Lab Sample ID: LCS 160-486023/2-A
 Matrix: Solid
 Analysis Batch: 489004

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 486023

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Americium-241	96.4	92.49		9.77		0.671	pCi/g	96	87 - 116
Cesium-137	26.8	25.63		2.77	0.0700	0.131	pCi/g	96	87 - 120
Cobalt-60	9.57	9.188		1.00		0.0752	pCi/g	96	87 - 115

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-39827-20 DU
Matrix: Solid
Analysis Batch: 489006

Client Sample ID: HPPG-ESU-TU153B-020
Prep Type: Total/NA
Prep Batch: 486023

Analyte	Sample		DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Actinium-227	0.0437	U	0.2406	U	0.470		0.277	pCi/g	0.36	1
Actinium 228	0.165		0.2970		0.262		0.127	pCi/g	0.27	1
Bismuth-212	-0.319	U	0.0000	U	0.119		0.208	pCi/g	0.29	1
Bismuth-214	0.278		0.4186		0.144		0.0506	pCi/g	0.54	1
Cesium-137	0.0276	U	-0.02086	U	0.0440	0.0700	0.0788	pCi/g	0.51	1
Lead-210	-0.931	U	-0.6903	U	2.13		1.77	pCi/g	0.06	1
Lead-212	0.376		0.3174		0.100		0.0407	pCi/g	0.31	1
Lead-214	0.396		0.3037		0.116		0.0662	pCi/g	0.38	1
Potassium-40	8.41		8.590		1.76		0.286	pCi/g	0.05	1
Protactinium-231	0.000	U	0.0000	U	0.778		2.37	pCi/g	0	1
Protactinium-234	0.0627	U	0.1094	U	0.293		0.252	pCi/g	0.1	1
Radium-226	0.278		0.4186		0.144	0.200	0.0506	pCi/g	0.54	1
Radium-228	0.165		0.2970		0.262		0.127	pCi/g	0.27	1
Thallium-208	0.139		0.1347		0.0920		0.0391	pCi/g	0.03	1
Thorium-232	0.165		0.2970		0.262		0.127	pCi/g	0.27	1
Thorium-234	-0.551	U	1.311		0.836		0.450	pCi/g	1.18	1
Thorium 228	0.376		0.3174		0.100		0.0407	pCi/g	0.31	1
Uranium-235	0.125	U	-0.01168	U	0.435		0.465	pCi/g	0.20	1
Uranium-238	-0.551	U	1.311		0.836		0.450	pCi/g	1.18	1

Lab Sample ID: MB 160-486025/1-A
Matrix: Solid
Analysis Batch: 489011

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486025

Analyte	MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Actinium-227	-0.1532	U	0.857	0.857		0.280	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Actinium 228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-212	0.0000	U	0.377	0.377		0.560	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-214	-0.03130	U	0.0837	0.0838		0.176	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Cesium-137	-0.01454	U	0.0367	0.0368	0.0700	0.0502	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-210	0.7008	U	1.62	1.62		1.09	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-212	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-214	-0.04357	U	0.138	0.138		0.0937	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Potassium-40	-0.1967	U	1.08	1.08		0.304	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Protactinium-231	0.0000	U	0.447	0.447		2.23	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Protactinium-234	0.05300	U	0.167	0.167		0.134	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Radium-226	-0.03130	U	0.0837	0.0838	0.200	0.176	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Radium-228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thallium-208	0.009748	U	0.0116	0.0116		0.0430	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium-232	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium-234	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium 228	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Uranium-235	0.01238	U	0.313	0.313		0.256	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Uranium-238	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-486025/2-A
Matrix: Solid
Analysis Batch: 489012

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486025

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	99.03		10.4		0.571	pCi/g	103	87 - 116
Cesium-137	26.8	27.08		2.89	0.0700	0.0962	pCi/g	101	87 - 120
Cobalt-60	9.57	9.405		0.995		0.0413	pCi/g	98	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Rad

Leach Batch: 485315

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	Dry and Grind	
160-39827-2	HPPG-ESU-TU153B-002	Total/NA	Solid	Dry and Grind	
160-39827-3	HPPG-ESU-TU153B-003	Total/NA	Solid	Dry and Grind	
160-39827-4	HPPG-ESU-TU153B-004	Total/NA	Solid	Dry and Grind	
160-39827-5	HPPG-ESU-TU153B-005	Total/NA	Solid	Dry and Grind	
160-39827-6	HPPG-ESU-TU153B-006	Total/NA	Solid	Dry and Grind	
160-39827-7	HPPG-ESU-TU153B-007	Total/NA	Solid	Dry and Grind	
160-39827-8	HPPG-ESU-TU153B-008	Total/NA	Solid	Dry and Grind	
160-39827-9	HPPG-ESU-TU153B-009	Total/NA	Solid	Dry and Grind	
160-39827-10	HPPG-ESU-TU153B-010	Total/NA	Solid	Dry and Grind	
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	Dry and Grind	
160-39827-12	HPPG-ESU-TU153B-012	Total/NA	Solid	Dry and Grind	
160-39827-13	HPPG-ESU-TU153B-013	Total/NA	Solid	Dry and Grind	
160-39827-14	HPPG-ESU-TU153B-014	Total/NA	Solid	Dry and Grind	
160-39827-15	HPPG-ESU-TU153B-015	Total/NA	Solid	Dry and Grind	
160-39827-16	HPPG-ESU-TU153B-016	Total/NA	Solid	Dry and Grind	
160-39827-17	HPPG-ESU-TU153B-017	Total/NA	Solid	Dry and Grind	
160-39827-18	HPPG-ESU-TU153B-018	Total/NA	Solid	Dry and Grind	
160-39827-19	HPPG-ESU-TU153B-019	Total/NA	Solid	Dry and Grind	
160-39827-20	HPPG-ESU-TU153B-020	Total/NA	Solid	Dry and Grind	
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	Dry and Grind	
160-39827-22	HPPG-ESU-TU153B-022	Total/NA	Solid	Dry and Grind	
160-39827-23	HPPG-ESU-TU153B-023	Total/NA	Solid	Dry and Grind	
160-39827-24	HPPG-ESU-TU153B-024	Total/NA	Solid	Dry and Grind	
160-39827-11 DU	HPPG-ESU-TU153B-011	Total/NA	Solid	Dry and Grind	
160-39827-20 DU	HPPG-ESU-TU153B-020	Total/NA	Solid	Dry and Grind	

Leach Batch: 485363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-25	HPPG-ESU-TU153B-025	Total/NA	Solid	Dry and Grind	
160-39827-26	HPPG-F-007	Total/NA	Solid	Dry and Grind	
160-39827-27	HPPG-F-008	Total/NA	Solid	Dry and Grind	

Prep Batch: 486023

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	Fill_Geo-21	485315
160-39827-2	HPPG-ESU-TU153B-002	Total/NA	Solid	Fill_Geo-21	485315
160-39827-3	HPPG-ESU-TU153B-003	Total/NA	Solid	Fill_Geo-21	485315
160-39827-4	HPPG-ESU-TU153B-004	Total/NA	Solid	Fill_Geo-21	485315
160-39827-5	HPPG-ESU-TU153B-005	Total/NA	Solid	Fill_Geo-21	485315
160-39827-6	HPPG-ESU-TU153B-006	Total/NA	Solid	Fill_Geo-21	485315
160-39827-7	HPPG-ESU-TU153B-007	Total/NA	Solid	Fill_Geo-21	485315
160-39827-8	HPPG-ESU-TU153B-008	Total/NA	Solid	Fill_Geo-21	485315
160-39827-9	HPPG-ESU-TU153B-009	Total/NA	Solid	Fill_Geo-21	485315
160-39827-10	HPPG-ESU-TU153B-010	Total/NA	Solid	Fill_Geo-21	485315
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	Fill_Geo-21	485315
160-39827-12	HPPG-ESU-TU153B-012	Total/NA	Solid	Fill_Geo-21	485315
160-39827-13	HPPG-ESU-TU153B-013	Total/NA	Solid	Fill_Geo-21	485315
160-39827-14	HPPG-ESU-TU153B-014	Total/NA	Solid	Fill_Geo-21	485315
160-39827-15	HPPG-ESU-TU153B-015	Total/NA	Solid	Fill_Geo-21	485315
160-39827-16	HPPG-ESU-TU153B-016	Total/NA	Solid	Fill_Geo-21	485315

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
 SDG: G146599785

Rad (Continued)

Prep Batch: 486023 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-17	HPPG-ESU-TU153B-017	Total/NA	Solid	Fill_Geo-21	485315
160-39827-18	HPPG-ESU-TU153B-018	Total/NA	Solid	Fill_Geo-21	485315
160-39827-19	HPPG-ESU-TU153B-019	Total/NA	Solid	Fill_Geo-21	485315
160-39827-20	HPPG-ESU-TU153B-020	Total/NA	Solid	Fill_Geo-21	485315
MB 160-486023/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-486023/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-39827-20 DU	HPPG-ESU-TU153B-020	Total/NA	Solid	Fill_Geo-21	485315

Prep Batch: 486025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	Fill_Geo-21	485315
160-39827-22	HPPG-ESU-TU153B-022	Total/NA	Solid	Fill_Geo-21	485315
160-39827-23	HPPG-ESU-TU153B-023	Total/NA	Solid	Fill_Geo-21	485315
160-39827-24	HPPG-ESU-TU153B-024	Total/NA	Solid	Fill_Geo-21	485315
160-39827-25	HPPG-ESU-TU153B-025	Total/NA	Solid	Fill_Geo-21	485363
160-39827-26	HPPG-F-007	Total/NA	Solid	Fill_Geo-21	485363
160-39827-27	HPPG-F-008	Total/NA	Solid	Fill_Geo-21	485363
MB 160-486025/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-486025/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 486247

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	DPS-0	485315
MB 160-486247/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-486247/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 486707

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	DPS-0	485315
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	DPS-0	485315
MB 160-486707/15-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-486707/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-39827-11 DU	HPPG-ESU-TU153B-011	Total/NA	Solid	DPS-0	485315

Tracer/Carrier Summary

Page 90 of 139

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-1
SDG: G146599785

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)
160-39827-1	HPPG-ESU-TU153B-001	90.9
160-39827-11	HPPG-ESU-TU153B-011	96.2
160-39827-11 DU	HPPG-ESU-TU153B-011	93.8
160-39827-21	HPPG-ESU-TU153B-021	92.1
LCS 160-486247/1-A	Lab Control Sample	96.5
LCS 160-486707/1-A	Lab Control Sample	91.7
MB 160-486247/24-A	Method Blank	94.2
MB 160-486707/15-A	Method Blank	96.1

Tracer/Carrier Legend

Sr = Sr Carrier



Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39827-2
Laboratory Sample Delivery Group: G146599785
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
12/31/2020 1:15:58 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Job ID: 160-39827-2

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39827-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Job ID: 160-39827-2 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 18.9 C.

Additional analysis added by the client and not listed on the COC.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11) and HPPG-ESU-TU153B-021 (160-39827-21) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/12/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491191/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153B-001 (160-39827-1), HPPG-ESU-TU153B-011 (160-39827-11) and HPPG-ESU-TU153B-021 (160-39827-21) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/12/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491192/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murri

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/8/2020

Waybill Number: 4957 0225 2175

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested

Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	
	Strontium-90 (EPA 905 MOD)	



Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested										Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Preservatives (water)	Preservatives (soil)												
HPPG-ESU-TU153B-001	10/7/2020	10:34	G	SO	1	16 oz. plastic jar	X	X	X									4	GJ46599785	
HPPG-ESU-TU153B-002	10/7/2020	10:39	G	SO	1	16 oz. plastic jar	X											4	GJ46599785	
HPPG-ESU-TU153B-003	10/7/2020	10:47	G	SO	1	16 oz. plastic jar	X											4	GJ46599785	
HPPG-ESU-TU153B-004	10/7/2020	10:55	G	SO	1	16 oz. plastic jar	X											5	GJ46599785	
HPPG-ESU-TU153B-005	10/7/2020	11:02	G	SO	1	16 oz. plastic jar	X											4	GJ46599785	
HPPG-ESU-TU153B-006	10/7/2020	11:18	G	SO	1	16 oz. plastic jar	X											4	GJ46599785	
HPPG-ESU-TU153B-007	10/7/2020	12:31	G	SO	1	16 oz. plastic jar	X											4	GJ46599785	
HPPG-ESU-TU153B-008	10/7/2020	12:34	G	SO	1	16 oz. plastic jar	X											5	GJ46599785	

Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other

Level of QC Required: I II III Project Specific

Method Codes: C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/07/2020 16:09	Locked Stored (RKillpack)		10/07/2020 16:09
Locked Stored (RKillpack)		10/08/2020 10:21	Devin Lewis		10/08/2020 10:21
Devin Lewis		10/08/2020 10:32	SHIPPED TO LAB	FED EX	OCT 09 2020

*** Last 3 transfers shown above - Complete list of transfers on last page ***

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12/31/2020





CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Berick
Phone #: (619)213-3389

Send Report to: Rose Cordit
Phone/Fax Number: 415-967-3760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Murr

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/8/2020

Waybill Number: 4957 0225 2175

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MCD)	Strontium-90 (EPA 905 MCD)						
HPPG-ESU-TU153B-009	10/7/2020	12:39	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-010	10/7/2020	12:46	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-011	10/7/2020	12:52	G	SO	1	16 oz. plastic jar	X	X	X				4	GJ46599785	
HPPG-ESU-TU153B-012	10/7/2020	12:58	G	SO	1	16 oz. plastic jar	X						5	GJ46599785	
HPPG-ESU-TU153B-013	10/7/2020	13:05	G	SO	1	16 oz. plastic jar	X						5	GJ46599785	
HPPG-ESU-TU153B-014	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-015	10/7/2020	13:18	G	SO	1	16 oz. plastic jar	X						5	GJ46599785	
HPPG-ESU-TU153B-016	10/7/2020	13:20	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-017	10/7/2020	13:22	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-018	10/7/2020	13:29	G	SO	1	16 oz. plastic jar	X						5	GJ46599785	
HPPG-ESU-TU153B-019	10/7/2020	13:31	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-020	10/7/2020	13:33	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-021	10/7/2020	13:35	G	SO	1	16 oz. plastic jar	X	X	X				4	GJ46599785	
HPPG-ESU-TU153B-022	10/7/2020	13:38	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-023	10/7/2020	13:41	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	
HPPG-ESU-TU153B-024	10/7/2020	13:44	G	SO	1	16 oz. plastic jar	X						5	GJ46599785	
HPPG-ESU-TU153B-025	10/7/2020	13:49	G	SO	1	16 oz. plastic jar	X						4	GJ46599785	

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12/31/2020



CHAIN OF CUSTODY

Ref. Document # 501197RSY-007

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez
Andrew Muri

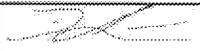
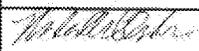
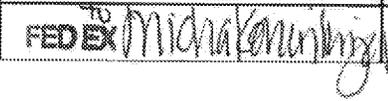
Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4957 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Ridler Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Date	Time	Method	Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
							Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)					
						Preservatives (water)								
						Preservatives (soil)								
HPPG-F-007	10/7/2020	10:55	G	SO	1	16 oz. plastic jar	X					4	GJ46599785	
HPPG-F-008	10/7/2020	13:13	G	SO	1	16 oz. plastic jar	X					4	GJ46599785	



All Transfers for COC 501197RSY-007

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/07/2020 16:09	Locked Stored (RKillpack)		10/07/2020 16:09
Locked Stored (RKillpack)		10/08/2020 10:21	Devin Lewis		10/08/2020 10:21
Devin Lewis		10/08/2020 10:32	SHIPPEDTOLAB	 FED EX TO Midna Kambing	10/08/2020 10:55



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39827-2

SDG Number: G146599785

Login Number: 39827**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Method	Method Description	Protocol	Laboratory
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39827-1	HPPG-ESU-TU153B-001	Solid	10/07/20 10:34	10/09/20 08:55	
160-39827-11	HPPG-ESU-TU153B-011	Solid	10/07/20 12:52	10/09/20 08:55	
160-39827-21	HPPG-ESU-TU153B-021	Solid	10/07/20 13:35	10/09/20 08:55	



Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-001

Lab Sample ID: 160-39827-1

Date Collected: 10/07/20 10:34

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-239/240	0.00203	U	0.00406	0.00407	0.100	0.00473	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Pu-242 (T)</i>	82.6		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-235/236	0.0236		0.0163	0.0165	0.100	0.00549	pCi/g	12/08/20 18:27	12/29/20 15:24	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Uranium-232</i>	89.2		30 - 110					12/08/20 18:27	12/29/20 15:24	1

Client Sample ID: HPPG-ESU-TU153B-011

Lab Sample ID: 160-39827-11

Date Collected: 10/07/20 12:52

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-239/240	0.00197	U	0.00394	0.00395	0.100	0.00459	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Pu-242 (T)</i>	85.3		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-235/236	0.00992	U	0.0157	0.0157	0.100	0.00999	pCi/g	12/08/20 18:27	12/29/20 15:24	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Uranium-232</i>	87.6		30 - 110					12/08/20 18:27	12/29/20 15:24	1

Client Sample ID: HPPG-ESU-TU153B-021

Lab Sample ID: 160-39827-21

Date Collected: 10/07/20 13:35

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-239/240	-0.00396	U	0.00561	0.00562	0.100	0.00652	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Pu-242 (T)</i>	87.4		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Client Sample ID: HPPG-ESU-TU153B-021

Lab Sample ID: 160-39827-21

Date Collected: 10/07/20 13:35

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-235/236	0.0171		0.0162	0.0163	0.100	0.00803	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	99.9		30 - 110					12/08/20 18:27	12/29/20 15:25	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-491192/1-A
 Matrix: Solid
 Analysis Batch: 493438

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 491192

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-235/236	0.002324	U	0.0154	0.0154	0.100	0.0121	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	MB MB		Limits					Prepared	Analyzed	Dil Fac
Uranium-232	110		30 - 110					12/08/20 18:27	12/29/20 15:25	1

Lab Sample ID: LCS 160-491192/2-A
 Matrix: Solid
 Analysis Batch: 493439

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 491192

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Uranium-234	3.18	2.973		0.294	0.100	0.0114	pCi/g	93	84 - 120
Uranium-238	3.26	3.045		0.299	0.100	0.00463	pCi/g	94	82 - 122
Tracer	LCS LCS		Limits						
Uranium-232	99.3		30 - 110						

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-491191/1-A
 Matrix: Solid
 Analysis Batch: 493386

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 491191

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-239/240	0.003831	U	0.00938	0.00939	0.100	0.00630	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	MB MB		Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	93.0		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Lab Sample ID: LCS 160-491191/2-A
 Matrix: Solid
 Analysis Batch: 493387

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 491191

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Plutonium-239/240	2.64	2.491		0.250	0.100	0.00439	pCi/g	94	81 - 125
Tracer	LCS LCS		Limits						
Pu-242 (T)	97.0		30 - 110						

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
 SDG: G146599785

Rad

Leach Batch: 490789

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	Dry and Grind	
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	Dry and Grind	
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	Dry and Grind	

Prep Batch: 491191

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	ExtChrom	490789
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	ExtChrom	490789
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	ExtChrom	490789
MB 160-491191/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491191/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 491192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39827-1	HPPG-ESU-TU153B-001	Total/NA	Solid	ExtChrom	490789
160-39827-11	HPPG-ESU-TU153B-011	Total/NA	Solid	ExtChrom	490789
160-39827-21	HPPG-ESU-TU153B-021	Total/NA	Solid	ExtChrom	490789
MB 160-491192/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491192/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39827-2
SDG: G146599785

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-39827-1	HPPG-ESU-TU153B-001	82.6	
160-39827-11	HPPG-ESU-TU153B-011	85.3	
160-39827-21	HPPG-ESU-TU153B-021	87.4	
LCS 160-491191/2-A	Lab Control Sample	97.0	
MB 160-491191/1-A	Method Blank	93.0	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-39827-1	HPPG-ESU-TU153B-001	89.2	
160-39827-11	HPPG-ESU-TU153B-011	87.6	
160-39827-21	HPPG-ESU-TU153B-021	99.9	
LCS 160-491192/2-A	Lab Control Sample	99.3	
MB 160-491192/1-A	Method Blank	110	

Tracer/Carrier Legend
U-232 = Uranium-232



Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39828-1
Laboratory Sample Delivery Group: D1189476
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/19/2021 9:46:07 AM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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Expert**

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Job ID: 160-39828-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39828-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for strontium

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Job ID: 160-39828-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.9 C.

TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were leached on 10/13/2020, prepared on 10/27/2020 and analyzed on 11/12/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153B-B-001 (160-39828-1) and (160-39828-A-1-A DU).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were leached on 10/13/2020, prepared on 10/18/2020 and analyzed on 11/13/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU153B-B-001 (160-39828-1)

The MB z-score for Th-234/U-238 associated with Prep Batch 160-486025 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-486025/1-A)

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Job ID: 160-39828-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



All Transfers for COC 501197RSY-008

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/08/2020 11:10	SHIPPEDTOLAB		



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39828-1

SDG Number: D1189476

Login Number: 39828**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39828-1	HPPG-ESU-TU153B-B-001	Solid	10/08/20 09:40	10/09/20 08:55	



Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Client Sample ID: HPPG-ESU-TU153B-B-001

Lab Sample ID: 160-39828-1

Date Collected: 10/08/20 09:40

Matrix: Solid

Date Received: 10/09/20 08:55

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0677		0.0640	0.0641	0.160	0.0474	pCi/g	10/27/20 08:55	11/12/20 12:46	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Sr Carrier</i>	96.7		40 - 110					10/27/20 08:55	11/12/20 12:46	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.406	U	0.774	0.775		0.466	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Actinium 228	0.386		0.307	0.310		0.149	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Bismuth-212	0.440	U	0.791	0.792		0.605	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Bismuth-214	0.404		0.122	0.131		0.0473	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Cesium-137	-0.0534	U	0.0451	0.0455	0.0700	0.0757	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Lead-210	1.04		1.30	1.31		0.920	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Lead-212	0.350		0.105	0.113		0.0632	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Lead-214	0.543		0.145	0.158		0.0638	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Potassium-40	8.85		1.73	2.01		0.463	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Protactinium-231	-0.366	U	3.18	3.18		2.60	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Protactinium-234	-0.0870	U	0.346	0.346		0.283	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Radium-226	0.404		0.122	0.131	0.200	0.0473	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Radium-228	0.386		0.307	0.310		0.149	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thallium-208	0.200		0.0679	0.0718		0.0238	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thorium-232	0.386		0.307	0.310		0.149	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thorium-234	-0.535	U	0.648	0.651		0.945	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Thorium 228	0.350		0.105	0.113		0.0632	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Uranium-235	0.00585	U	0.457	0.457		0.376	pCi/g	10/18/20 19:20	11/13/20 18:33	1
Uranium-238	-0.535	U	0.648	0.651		0.945	pCi/g	10/18/20 19:20	11/13/20 18:33	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-486883/9-A
Matrix: Solid
Analysis Batch: 488987

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486883

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.07370		0.0654	0.0656	0.160	0.0481	pCi/g	10/27/20 08:55	11/12/20 18:59	1
Carrier	MB MB		Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	40 - 110					10/27/20 08:55	11/12/20 18:59	1

Lab Sample ID: LCS 160-486883/1-A
Matrix: Solid
Analysis Batch: 488987

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 486883

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.78	6.631		0.547	0.160	0.0465	pCi/g	85	75 - 125
Carrier	LCS LCS		Limits						
Sr Carrier	%Yield	Qualifier	40 - 110						
	89.9								

Lab Sample ID: 160-39828-1 DU
Matrix: Solid
Analysis Batch: 488987

Client Sample ID: HPPG-ESU-TU153B-B-001
Prep Type: Total/NA
Prep Batch: 486883

Analyte	Sample Sample		DU DU		Total	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Total Beta Strontium	0.0677		0.04157	U	0.0607	0.160	0.0461	pCi/g	0.21	1
Carrier	DU DU		Limits							
Sr Carrier	%Yield	Qualifier	40 - 110							
	84.9									

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-486025/1-A
Matrix: Solid
Analysis Batch: 489011

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 486025

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.1532	U	0.857	0.857		0.280	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Actinium 228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-212	0.0000	U	0.377	0.377		0.560	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Bismuth-214	-0.03130	U	0.0837	0.0838		0.176	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Cesium-137	-0.01454	U	0.0367	0.0368	0.0700	0.0502	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-210	0.7008	U	1.62	1.62		1.09	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-212	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Lead-214	-0.04357	U	0.138	0.138		0.0937	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Potassium-40	-0.1967	U	1.08	1.08		0.304	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Protactinium-231	0.0000	U	0.447	0.447		2.23	pCi/g	10/18/20 19:20	11/13/20 18:28	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-486025/1-A
 Matrix: Solid
 Analysis Batch: 489011

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 486025

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Protactinium-234	0.05300	U	0.167	0.167		0.134	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Radium-226	-0.03130	U	0.0837	0.0838	0.200	0.176	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Radium-228	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thallium-208	0.009748	U	0.0116	0.0116		0.0430	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium-232	-0.1683	U	0.354	0.355		0.183	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium-234	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Thorium 228	-0.02926	U	0.130	0.130		0.0758	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Uranium-235	0.01238	U	0.313	0.313		0.256	pCi/g	10/18/20 19:20	11/13/20 18:28	1
Uranium-238	0.7122		0.466	0.472		0.347	pCi/g	10/18/20 19:20	11/13/20 18:28	1

Lab Sample ID: LCS 160-486025/2-A
 Matrix: Solid
 Analysis Batch: 489012

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 486025

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Cesium-137	26.8	27.08		2.89	0.0700	0.0962	pCi/g	101	87 - 120
Cobalt-60	9.57	9.405		0.995		0.0413	pCi/g	98	87 - 115

Lab Sample ID: 160-39828-1 DU
 Matrix: Solid
 Analysis Batch: 489009

Client Sample ID: HPPG-ESU-TU153B-B-001
 Prep Type: Total/NA
 Prep Batch: 486025

Analyte	Sample Sample		DU DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Actinium-227	-0.406	U	0.4101		0.406		0.224	pCi/g	0.69	1
Actinium 228	0.386		0.3376		0.223		0.0937	pCi/g	0.09	1
Bismuth-212	0.440	U	-0.02076	U	0.740		0.608	pCi/g	0.30	1
Bismuth-214	0.404		0.4547		0.126		0.0440	pCi/g	0.20	1
Cesium-137	-0.0534	U	0.02061	U	0.0572	0.0700	0.0450	pCi/g	0.72	1
Lead-210	1.04		1.670		1.98		1.17	pCi/g	0.19	1
Lead-212	0.350		0.4370		0.102		0.0437	pCi/g	0.41	1
Lead-214	0.543		0.5199		0.129		0.0587	pCi/g	0.08	1
Potassium-40	8.85		9.126		1.63		0.115	pCi/g	0.08	1
Protactinium-231	-0.366	U	0.0000	U	0.276		2.23	pCi/g	0.11	1
Protactinium-234	-0.0870	U	0.04812	U	0.0325		0.251	pCi/g	0.36	1
Radium-226	0.404		0.4547		0.126	0.200	0.0440	pCi/g	0.20	1
Radium-228	0.386		0.3376		0.223		0.0937	pCi/g	0.09	1
Thallium-208	0.200		0.2126		0.0619		0.0141	pCi/g	0.09	1
Thorium-232	0.386		0.3376		0.223		0.0937	pCi/g	0.09	1
Thorium-234	-0.535	U	0.4940		0.660		0.464	pCi/g	0.78	1
Thorium 228	0.350		0.4370		0.102		0.0437	pCi/g	0.41	1
Uranium-235	0.00585	U	-0.03244	U	0.0582		0.514	pCi/g	0.07	1
Uranium-238	-0.535	U	0.4940		0.660		0.464	pCi/g	0.78	1

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
 SDG: D1189476

Rad

Leach Batch: 485363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Dry and Grind	
160-39828-1 DU	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 486025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Fill_Geo-21	485363
MB 160-486025/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-486025/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-39828-1 DU	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Fill_Geo-21	485363

Prep Batch: 486883

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	DPS-0	485363
MB 160-486883/9-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-486883/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-39828-1 DU	HPPG-ESU-TU153B-B-001	Total/NA	Solid	DPS-0	485363

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-1
SDG: D1189476

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-39828-1	HPPG-ESU-TU153B-B-001	96.7	
160-39828-1 DU	HPPG-ESU-TU153B-B-001	84.9	
LCS 160-486883/1-A	Lab Control Sample	89.9	
MB 160-486883/9-A	Method Blank	93.8	

Tracer/Carrier Legend
Sr = Sr Carrier



Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-39828-2
Laboratory Sample Delivery Group: D1189476
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/5/2021 11:04:00 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Job ID: 160-39828-2

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-39828-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 10/09/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Job ID: 160-39828-2 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 18.9 C.

Additional analysis requested and not listed on the COC.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/13/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491191/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153B-B-001 (160-39828-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/13/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491192/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-008

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

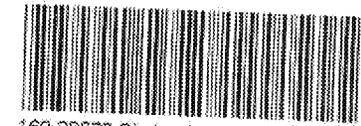
Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/8/2020
Waybill Number: 4457 0225 2175
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested



160-39828 Chain of Custody

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Total Strontium (EPA 905 MOD)	Strontium-90 (EPA 905 MOD)					
HPPG-ESU-TU1538-B-001	10/8/2020	09:40	G	SO	1	16 oz. plastic jar	X	X	X			4	D1189476	

Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g
21 day ingrowth results only

Turnaround Time: 3-day 10-Day 28-day Other Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil, GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/08/2020 11:10	SHIPPED TO LAB FED EX		09:55 OCT 09 2020

*** Last 3 transfers shown above - Complete list of transfers on last page ***



All Transfers for COC 501197RSY-008

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/08/2020 11:10	SHIPPEDTOLAB		



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-39828-2

SDG Number: D1189476

Login Number: 39828**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Ridenhower, Rhonda E**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Method	Method Description	Protocol	Laboratory
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-39828-1	HPPG-ESU-TU153B-B-001	Solid	10/08/20 09:40	10/09/20 08:55	



Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
 SDG: D1189476

Client Sample ID: HPPG-ESU-TU153B-B-001

Lab Sample ID: 160-39828-1

Date Collected: 10/08/20 09:40

Matrix: Solid

Date Received: 10/09/20 08:55

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-239/240	0.0206		0.0131	0.0132	0.100	0.00480	pCi/g	12/08/20 18:08	12/29/20 09:30	1
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Pu-242 (T)</i>	<i>84.9</i>		<i>30 - 110</i>					<i>12/08/20 18:08</i>	<i>12/29/20 09:30</i>	<i>1</i>

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-235/236	0.0238		0.0151	0.0152	0.100	0.00554	pCi/g	12/08/20 18:27	12/29/20 15:25	1
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Uranium-232</i>	<i>103</i>		<i>30 - 110</i>					<i>12/08/20 18:27</i>	<i>12/29/20 15:25</i>	<i>1</i>

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
 SDG: D1189476

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-491192/1-A
Matrix: Solid
Analysis Batch: 493438

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491192

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-235/236	0.002324	U	0.0154	0.0154	0.100	0.0121	pCi/g	12/08/20 18:27	12/29/20 15:25	1
Tracer	MB MB		Limits					Prepared	Analyzed	Dil Fac
Uranium-232	110		30 - 110					12/08/20 18:27	12/29/20 15:25	1

Lab Sample ID: LCS 160-491192/2-A
Matrix: Solid
Analysis Batch: 493439

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491192

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Uranium-234	3.18	2.973		0.294	0.100	0.0114	pCi/g	93	84 - 120
Uranium-238	3.26	3.045		0.299	0.100	0.00463	pCi/g	94	82 - 122
Tracer	LCS LCS		Limits						
Uranium-232	99.3		30 - 110						

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-491191/1-A
Matrix: Solid
Analysis Batch: 493386

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491191

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-239/240	0.003831	U	0.00938	0.00939	0.100	0.00630	pCi/g	12/08/20 18:08	12/29/20 09:30	1
Tracer	MB MB		Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	93.0		30 - 110					12/08/20 18:08	12/29/20 09:30	1

Lab Sample ID: LCS 160-491191/2-A
Matrix: Solid
Analysis Batch: 493387

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491191

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Plutonium-239/240	2.64	2.491		0.250	0.100	0.00439	pCi/g	94	81 - 125
40									
Tracer	LCS LCS		Limits						
Pu-242 (T)	97.0		30 - 110						

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Rad

Leach Batch: 490790

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 491191

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	ExtChrom	490790
MB 160-491191/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491191/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 491192

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-39828-1	HPPG-ESU-TU153B-B-001	Total/NA	Solid	ExtChrom	490790
MB 160-491192/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491192/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-39828-2
SDG: D1189476

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-39828-1	HPPG-ESU-TU153B-B-001	84.9	
LCS 160-491191/2-A	Lab Control Sample	97.0	
MB 160-491191/1-A	Method Blank	93.0	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-39828-1	HPPG-ESU-TU153B-B-001	103	
LCS 160-491192/2-A	Lab Control Sample	99.3	
MB 160-491192/1-A	Method Blank	110	

Tracer/Carrier Legend
U-232 = Uranium-232

From: [Ridenhower, Rhonda](#)
To: [Condit, Rose](#)
Cc: [Engel, Audrey](#); [Ramirez, Joaquin](#)
Subject: RE: Parcel G Alpha Spec request
Date: Wednesday, December 2, 2020 9:19:43 PM

EXTERNAL SENDER

Rose,

All samples have had Iso U and Pu added. I will post the sample confirmation in the morning.

Thank you,
Rhonda

Rhonda Ridenhower
Client Service Manager

Phone: 314-298-8566
Direct: 314-787-8227

E-mail: Rhonda.Ridenhower@eurofinset.com

From: Condit, Rose <rose.condit@aptim.com>
Sent: Wednesday, December 2, 2020 6:36 PM
To: Ridenhower, Rhonda <Rhonda.Ridenhower@Eurofinset.com>
Cc: Engel, Audrey <Audrey.Engel@aptim.com>; Ramirez, Joaquin <Joaquin.Ramirez@aptim.com>
Subject: Parcel G Alpha Spec request

EXTERNAL EMAIL*

Hi Rhonda, will you please add Alpha Spec – Pu-239 and U-235 to the following WO#s:

160-39748 (samples -01, -11, -21)
160-39749 (sample -01)
160-39827 (Sample -01, -11, -21)
160-39828 (sample -01)
160-40004 (Sample -01, -11, -21)
160-40005 (Sample -01)
160-40006 (Sample -01, -11, -21)

Let me know if you have any questions.

Rose Condit
Project Chemist
O 925 288 2151
M 925 890 5373

[E rose.condit@aplrim.com](mailto:rose.condit@aplrim.com)



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